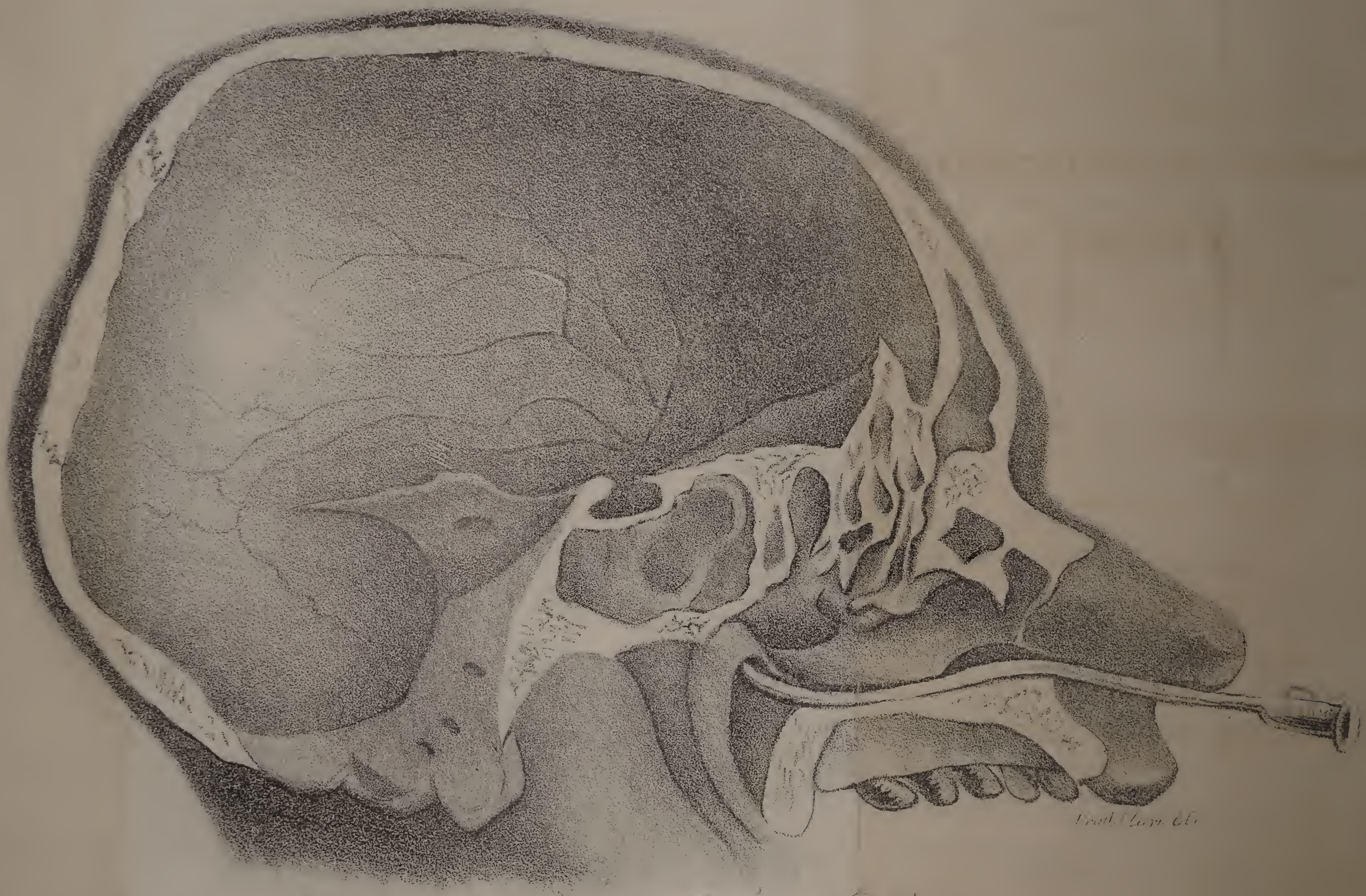
45632/B

26 Sept: 1832

DISEASES OF THE EAR.

Digitized by the Internet Archive
in 2018 with funding from
Wellcome Library

https://archive.org/details/b2933648x



VERTICAL SECTION OF THE HEAD — *of a Fœtus of Dr Tarry,*
in its relation to the nasal passages, and the guttural orifice of tuba.

91017

AN ESSAY

ON THE

DISEASES OF THE INTERNAL EAR,

By J. A. SAISSY, M. D.

MEMBER OF THE ROYAL ACADEMY OF SCIENCES, LITERATURE AND ARTS IN LYONS,
FELLOW OF THE AGRICULTURAL AND MEDICAL SOCIETY OF THE SAME CITY,
OF THE ACADEMIES OF TURIN, ROUEN, AND DIJON,
AND OF THE MEDICAL SOCIETIES OF BORDEAUX, ORLEANS, MARSEILLES, ETC.

HONOURED WITH A PREMIUM BY THE MEDICAL SOCIETY OF BORDEAUX
AND SINCE ENLARGED BY THE AUTHOR.

TRANSLATED FROM THE FRENCH, BY

NATHAN R. SMITH, M. D.

PROFESSOR OF SURGERY IN THE UNIVERSITY OF MARYLAND,

WITH A SUPPLEMENT ON

DISEASES OF THE EXTERNAL EAR,

BY THE TRANSLATOR.

Baltimore:
PUBLISHED BY HATCH & DUNNING.
1829.

DISTRICT OF MARYLAND, TO WIT:

BE IT REMEMBERED, That on the tenth day of September, in the fifty-fourth year of the Independence of the United States of America, Hatch & Dunning, of the said district, have deposited in this office, the title of a book, the right whereof they claim as proprietors, in the words following, to wit:

"An Essay on the Diseases of the Internal Ear, by J. A. Saissy, M. D. member of the Royal Academy of Sciences, Literature and Arts in Lyons, fellow of the Agricultural and Medical Society of the same city, of the Academies of Turin, Rouen and Dijou, and of the Medical Societies of Bordeaux, Orleans, Marseilles, &c. A work honoured with a premium by the Medical Society of Bordeaux, and since enlarged by the Author. Translated from the French by Nathan R Smith, M. D. Professor of Surgery in the University of Maryland; with a supplement on Diseases of the External Ear, by the Translator."

In conformity to the Act of the Congress of the United States, entitled, "An Act for the encouragement of learning, by securing the copies of maps, charts, and books, to the authors and proprietors of such copies, during the times therein mentioned;" and also to the act, entitled "An Act supplementary to the act, entitled 'An act for the encouragement of learning, by securing the copies of maps, charts and books, to the authors and proprietors of such copies during the times therein mentioned:' and extending the benefits thereof to the arts of designing, engraving, and etching historical and other prints."

PHILIP MOORE,
Clerk of the District of Maryland.

BAILEY & FRANCIS, PRINT.

WELLCOME HISTORICAL MEDICAL LIBRARY

PREFACE,

BY THE TRANSLATOR.

A CONCISE manual on the diseases of the ear is an acknowledged desideratum in our medical literature. No sufficient work on this subject has ever been issued from the American press. With a view to supply this deficiency, I have translated the following pages from the French of Saissy. The work first appeared in 1819, as an article of the Dictionnaire des Sciences Médicales. It was subsequently corrected and enlarged by its author, and after his death was published in 1827 by his friend Montain, with notes by Dr. Th. Perrin.

In this valuable work the author has, with industrious research, availed himself of all the previous improvements in this department of surgery. It embodies the excellencies of Saunders, Cooper, Lesehevin, Maunoir, Itard, and Alard, and I believe there will be found in the accompanying notes nearly all the valuable facts which have been ascertained in relation to this subject since the death of Saissy.

The work, I understand, is highly esteemed in France, and the practice recommended in it has been attended with very encouraging success.

The attention of the reader will be particularly occupied with Saissy's excellent method of injecting the ear through the eustachian tube. We very well know how frequently the external ear is obstructed by its own secretions, free as is their egress from this cavity. The internal ear is also lined with a membrane which furnishes an excrementitious fluid.

It can escape only by the narrow channel of the eustachian tube. How frequently then must it be delayed in the cavity of the tympanum and mastoid cells, giving rise to any degree of mischief.

How often do we see, covering the body of the foetus at birth, a concrete, white, mucous substance secreted by the skin or deposited from the liquor amnii. This fluid also at birth fills the cavity of the tympanum, and we must necessarily infer that this deposit is present there also, and that in many instances it may be the cause of congenital deafness.

To render the work more complete and useful to the medical pupil, I have added a brief supplement on the diseases of the external ear. On this score, however, I claim nothing, as my addition is made up of common-place principles and precepts subjoined merely for the purpose named above. I have, it is true, for perforating the tympanum, devised a new instrument which I trust will be found useful. N. R. S.

HEARING is one of the important functions of the life of relation; its deprivation is, to man, a source of suffering, and its exercise one of great enjoyment. The organ designed for the performance of this important function is exposed, as are the other senses, to numerous diseases; its painful affections are often excruciating; its frequent inflammations impede and sometimes destroy its functions, and its organic lesions diminish or pervert the power of perception. The affections of this important sense are even imparted to that noble faculty of man—the power of communicating his ideas by speech. The voice is affected simultaneously with hearing, and the loss of the latter faculty often induces imperfections of speech, or even its entire loss. Thus, as Buffon has observed, hearing is far more necessary to man than to other animals, because, in the latter, this sense is but a passive property, capable merely of transmitting external impressions. In man, it is not a mere passive endowment, but a faculty which becomes active through the medium of the organs of speech.

Persuaded of the importance of this sense, to the happiness of man, Dr. Saissy devoted a part of his life to the study of its anatomy, its physiology, its diseases, and their treatment. Encouraged by his experience and the success of his practice, he was about to publish his work, when death snatched him from the science which he honoured and which he cultivated with so much success. Satisfied of the excellence of the work, a witness of the frequent success of the author, I now fulfil his intentions and those of his family, in presenting the public with

this excellent treatise on the Diseases of the Ear, which work I shall premise with a biographic notice.

Doctor Th. Perrin, physician to the Institution of Deaf-Mutes, at Lyons, and who is particularly occupied with diseases of the ear, has kindly offered to aid me with his experience in this interesting department of Therapeutics. He has added to the work many notes, and a lithographic sketch from nature, representing the sound of Dr. Saissy, in its relation to the nasal cavities and the eustachian tube.

BIOGRAPHIC NOTICE

OF

JEAN ANTOINE SAISSY.

It is the usual reward of the man of modest merit, that the respectful remembrance of him, which survives the tomb, attaches itself to his name, and is associated with his works; and in placing over his cemetery the ensigns of immortality, posterity delights to imitate the man, by whose works they are enlightened and enriched. Such are the sentiments which have suggested this memoir of the life and labours of Dr. Saissy, a physician of distinguished modesty, and whose whole life was devoted to the cultivation of science and the relief of mankind.

Jean Antoine Saissy was born, February 2d, 1756, at Mongins, near Grasses, in the fine climate of Provence. His father, a wealthy planter, offered his son no other occupation than that to which he himself was devoted; but he allowed him that agreeable freedom which cherishes good or evil inclinations, especially in those mild climates, where the propensities have all the ardor of passion. A few medical books fell into the hands of Antoine Saissy, and he read them with avidity. They determined his future avocation, and nothing could afterwards divert him from a course, to which he seemed to be impelled. His father yields to his entreaties. Antoine Saissy desires to seek the highest sources of instruction—he repairs to Paris, and there cultivates, at once, all

the departments of the science to which he had devoted himself. But already a part of his life had been spent in the fields, and at twenty two years of age, he possessed no other education than that which he had acquired from the teacher of the village, and from such books as he could procure. In this Saissy gives us a striking example of the strength of resolution, and of native propensity. Like many other learned men, who honour science and the age, he sought to repair, by industry, the deficiencies of the past. He applied himself with care to the study of all the rules and principles of those languages which he had before neglected, because, till then, he had had no use for any other language than that of nature and necessity, to express his ardent thoughts. Nevertheless, having, for a long time, heard and spoken the language of Provence, he could not divest himself of an accent which gave his speech an appearance of abruptness, and at times a hurried expression, indicative of the activity of his mind, and the sprightliness of his fancy.

Antoine Saissy remained several years in Paris, and attended with zeal the most distinguished professors, from 1777, to 1782. His certificates are honoured with the names and encomiums of Louis, Chopart, Perihle, Pelletan, Hevin, Lassus, Ferrand, &c. All declare his ardour in the pursuit of science, and many speak of the honours which he achieved.

In 1783, Saissy was received, by election, as house-surgeon of the great Hotel-Dieu of Lyons, and, at the same time, entered there upon the discharge of his duties. He left it in 1786, and obtained from the authorities of the *Hôpital général de Notre-Dame-de-Pitie du pont du Rhone et grand Hotel-Dieu de Lyon* certificates which declare his complete qualifications, and the honourable manner in which he had discharged the duties of house-surgeon and those of demonstator of the course of anatomy and surgery.

A lively imagination, some degree of ambition, and vigorous health, induced Antoine Saissy to accept proposals from the Royal African Company. On leaving the Hotel-Dieu he went, as physician and surgeon major, to the Factories established on the coast of Barbary. Although time had not perfected the judgment of our professional brother, he perceived how injurious was the violent mode of practice pursued by the physicians of those countries. He discovered that they treated inflammations with stimulants, and that they kindled rather than extinguished them. He administered mild remedies, and combatted *inflammation*, rather than directed occult remedies against imagined diseases. He was fortunate because he was wise, and his reputation even entered the wall of the seraglio. The Dey of Constantinople took him to his residence, to attend one of his children, which he had the happiness to rescue from near and certain death. That prince made every exertion to attach him to himself, and to fix him permanently in his vicinity, but he knew the result of these splendid favours; he knew what violence often succeeded the extravagant complaisance of those tyrants,* who are as ignorant as they are proud, generous and ungrateful by turns, at one time prodigal in benefactions, and at another in horrible tortures. Antoine Saissy was desirous of avoiding the chances of such diverse fortunes, and he was recalled by his recollection of happy France, where barbarian ignorance reigns not over an enslaved people.

Soon after his return to France, on the 26th of June, 1798, Saissy defended, before the Chirurgical College of Lyons, a thesis on the Inoculation of the Small-Pox, and was made a member of the college. In the course of the same year, he

* A journal recently announced that the Sultan had commanded his chief physician to cure his Grand Vizier, on pain of death. M. T.

was made Doctor of Medicine, by the University de Valence, a title which it was necessary for him to obtain, in order to practice all the branches of the healing art. It was the same year that Dr. Saissy married the daughter of M. Thenance, a distinguished practitioner of Lyons, to whom we are indebted for some important observations on Parturition, and for the forceps which bear his name.

Dr. Saissy was employed in every branch of the healing art; but, after the example of his father-in-law, he devoted himself more especially to the practice of midwifery, an important branch of medicine, which, in our city, is not, as in many others, restricted to the mechanical routine of the accoucheur. Generally, whatever distinguished physician may have devoted himself to the practice of midwifery, extends his pursuits, and passes from the department of midwifery to that of physick. This was the reputable mode which Dr. Saissy adopted. It was by a practice thus laborious, that our estimable associate qualified himself to achieve one of the most honourable prizes decreed by the first Academy of Europe.

An important question was proposed by the Institute, in relation to the nature and causes of the phenomena exhibited by hybernating animals during the winter. The question was important, and required protracted and laborious research. It was necessary to surprise nature in the very act—it was necessary, so to speak, to winter with dormice, marmottes, and bats. Our professional brother was nothing discouraged by the difficulties of the undertaking; he regarded nothing but the pleasure of informing himself—of eliciting the secrets of nature, and the honour of shedding light upon the natural sciences. His wish was accomplished, and his work was preferred by choice of the learned of Europe. On the 4th of January, 1828, the Institute awarded to him the prize; a distinguished and grateful recompense, as honourable to the body

which gave it, as to the talent which knew how to deserve it. Dr. Saissy soon published his work, to which a discerning public rendered the same respect as did the Institute.

In 1810, he communicated to the Institute a valuable essay on Croup. That disease was at that time altogether new, and then first appeared in the medical horizon. Many believed that, till then, it had been confounded with other diseases, and especially with Cynanche Tonsillaris. That disease, which had for a long time destroyed with impunity, blighted the hopes of the throne, and awakened the attention of men of science and also of the government. Numerous memoirs upon Croup appeared, and Dr. Saissy was one of the first to devote his attention to the subject. By exciting expectoration, he had obtained the morbid membrane, which is formed in croup. Professors Cuvier, Hallé, and Pinel, made a report highly honourable to the work.

All the sciences were cultivated by Dr. Saissy with success. We have seen him obtain prizes on important topics in natural history, and discuss, with reputation, questions in medical science. We shall see him with equal advantage in another field. Natural Philosophy and Chemistry received his devoted attention. In 1811, he presented the Institute with an interesting memoir on the extrication of light, by the condensation of gas. He proved, by experiments, made in association with the learned Professors Molets and Reymond, that the disengagement of light is owing to oxygen, and that the experiment made upon other gases, when pure, does not produce it. "The property of producing heat belongs," says M. Thénard, "to all the gases; but, according to Saissy, the property of disengaging light, by these means, belongs to none but oxygen, chlorine, and air. Oxygen possesses it in a much higher degree than chlorine, and this last in a much higher degree than air." "What is very certain," Professor Thénard again re-

marks, "is that, by compression, much more light is extricated from oxygen than from air, and that it is not extricated at all from carbonic acid gas, azote, hydrogen, &c." Dr. Saissy has, therefore, established an important fact. It is rendering him sufficient honour to quote the approbation of Professor Thénard, and that of the Institute.

During the twelve last years of his life, he was particularly occupied with diseases of the ear, and the better to learn the morbid changes of that important organ, he studied its anatomy and physiology with great care. For that minute investigation, he tasked the same patience and perseverance which had enabled him to succeed in his work on hybernating animals. Whoever knew Dr. Saissy, could not conceive, how so ardent an imagination could confine itself to subjects which required the exercise of so much patience. I will not follow the author through the details of the excellent work which we are about to publish; I will merely observe that the whole is the result of experience and observation—that it was with the knife in hand that he demonstrated the anatomy of the ear, and that it was by frequent success that he has proved the excellence of his practice. Our distinguished associate learned to discover, with peculiar sagacity, the morbid changes of the eustachian tubes, and acquired singular dexterity in sounding them, and in conveying his injections into them. If his treatment is not altogether new, his mode of procedure is so. His canulæ and sounds are contrived in the most convenient manner, to enter, through the nasal cavities, the expansion of the eustachian tube; and his mode of doing this is his own. Dr. Saissy addressed a fragment of the work to the Medical Society of Bordeaux, in reply to a question proposed by that society, on the diseases of the ear, and he again received an honourable award.

He has written many important articles in the Dictionnaire des Sciences Médicales. The Medical Society of Lyons pos-

sesses, in its archives, a great many observations which were communicated by Doctor Saissy. During the last year of his life, and when he had already contracted the germ of the disease which was to destroy him, he read, at various times, different parts of his work, which he submitted, with his usual modesty, to the censure or approbation of his colleagues.

Doctor Saissy was connected with most of the learned societies; he was a member of the Academy of Lyons—of the Agricultural and Medical Societies of the same place—of the Academies of Turin, Rouen, Dijon, and of the Medical Societies of Bordeaux, Orleans, Marseilles, &c.

In the decline of life, or during the pains of a tedious and irremediable disease, man is often led back, by recollection, to those regions which witnessed his childhood. The hope of once more beholding them is grateful to his imagination, and he seems to derive new energy from reviewing those dear and delightful retreats, where he knew no ambition, nor the bitter disappointments of life. Thus Dr. Saissy, the last year of his life, believed that he should be able to regain his health, under the fine sky of Provence, which he had so long since forsaken. Sustained by hope, and the care of his children, he undertook the desired journey; but, vain hope!—the disease increased; hydrothorax supervened—a new desire possessed him, of coming to terminate his career in his adopted country—in the midst of his family and friends, where his labours had obtained for him more honour than emolument.

He arrived there on the 5th of March, 1822, no longer sustained by hope, but solaced by filial piety; and, two days after, he expired with the resignation of a good man.

MONTAIN,

Secretary General of the Medical Society, Professor of Therapeutics, Ex-Surgeon in Chief of the Hospital.

INTRODUCTION.

Among the diseases which afflict the human species, those of the internal ear require, on the part of the profession, new efforts and new researches. The works of Duverney, Valsalva, Morgagni, &c. &c. have, it is true, thrown some light upon this subject, but what topic is there on which there is left nothing more to be desired?

More recently those distinguished men, Cotunnus, Meckel, Scarpa and Comparéti, have enriched the science with their valuable discoveries—the first, by demonstrating that the labyrinth is filled with a thin fluid, instead of air supposed to be contained in it—the second, by giving a more true and definite description of the parts which line the labyrinth, and especially of the semicircular canals.

Mr. Cooper, the celebrated English surgeon, has shown, by experiment and observation, that by the perforation of the membrana tympani, we may, in certain cases of deafness, restore hearing.

Before the writings of Cotunnus and Meckel, we had no correct theory of the perception of sounds. Our notions in relation to the diseases of the organ of hearing and their treatment were still more erroneous.

Notwithstanding these new discoveries, the pathology and treatment of the diseases of the internal ear are yet very far from having attained to that degree of improvement of which they are susceptible. Certain powerful causes have opposed obstacles to that improvement.

1st. The structure of the auditory apparatus is extremely complicated; the parts which constitute its structure are so deeply hidden, that its diseases are concealed from view; and hence the uncertainty of their diagnosis.

2d. The belief that congenital deafness always depends upon some fault of original conformation. In consequence of such belief, that species of deafness is regarded as irremediable, so that no one presumes to employ the least remedial means. Nevertheless, there are means which we can conveniently use, and frequently with much benefit. I had an instance of this in the person of young Briguet. Congenital deafness, and that which occurs soon after birth, often depends merely upon inspissated mucus which obstructs the eustachian tube and the cavity of the drum. Nevertheless, I do not pretend to call in question the defect of early conformation, which often presents itself in the structure of the internal ear, such as we discover in other parts of the body; but it is only in this case that deafness is incurable.

3d. The difficulty of applying remedies immediately to the part affected, is another reason which has opposed the progress of the treatment of the diseases of the ear. That difficulty is removed, as regards the affections of the eustachian tube, the cavity of the tympanum, and the mastoid cells. The instruments which I have invented fulfil, in that respect, the end desired; for, by means of them, we can convey into those cavities the liquors which we judge proper. By their means many causes of deafness will be removed and hearing restored. Of this I am convinced by experiment and observation.

I do not propose to give a complete treatise on deafness, but only to throw some degree of light upon the etiology and treatment of that disease, and to furnish some further means of overcoming it. Indeed, by considering the diseases which affect the different parts of the internal ear, as being the cau-

ses which may give rise to deafness; by displaying each of those diseases; by seeking to ascertain their seats—the causes which produce and the symptoms which characterize them, the judgment and prognosis, in relation to the nature of deafness, will be less conjectural, the treatment more rational, and consequently more certain.

Before entering on the details which each disease may present, we will glance at deafness generally, and first will give a clear and concise definition of the disease. We shall avoid equivocal terms, or those which are employed with ambiguity. We shall reduce the divisions to as small a number as possible.

Definition.—Deafness is a total loss, or a considerable diminution of the sense of hearing.

Varieties.—We may reduce the varieties of deafness to the four following.

1st. If an infant has the defect at birth, it is called *congenital.*

2d. If it occur some time after birth, as the result of disease, it is denominated *accidental.*

3d. If it be the advance of age which gives rise to it, we give it the appellation of *senile.*

4th. Finally, when deafness attacks only one ear, it is termed *incomplete*, and *complete* when both ears are affected.

These four varieties of deafness will be embraced under two denominations.

When deafness is incipient and hearing is merely difficult, we shall term the disease (Dysécée) *difficult hearing.*

When deafness is complete and absolute, we shall, with most nosologists, denominate it (Cophose) *complete deafness.*

I shall not introduce, in this division, another defect of hearing, to which some have given the name of Paracousie, or *false-hearing.* Of those who are affected with it, some hear indistinctly words spoken with a loud voice, whilst the perception of feeble sounds is distinct. Others hear ordinary

sounds when aided by a loud noise which accompanies them; others hear all sounds double. I shall say nothing more of this variety of disease.

Causes.—The causes of deafness are so numerous, most of them so obscure, and some so singular, that it is difficult to give a complete enumeration, or a precise classification of them; nevertheless, we shall arrange them in the following order.

1st. Defects of original conformation in some part of the auditory apparatus,* or the absence of the acoustic nerve, may be a cause (a rare one indeed, but ascertained by port-mortem examination,) of congenital deafness.

2nd. Deafness is sometimes hereditary, like many other diseases, of which, at birth, we receive the germ, or if the expression be preferred, the *predisposition.* Truka† was consulted by a man thirty years of age, who had become deaf at the age of fourteen years, and whose father, mother, and three brothers, or sisters, all suffered the same disease. I know a man who became deaf at the age of forty years; he has told me that his paternal uncle, his father, and two of his brothers have, at the same age, experienced the same infirmity.

A physician who had resided a long time at Marseilles, communicated to me a very singular phenomenon. He informed me of a family in that city, consisting of six children, the first

* Imperfections of the external passages are very rare; I have had occasion to witness one instance, with Dr. Repiguet, *Chirurgien-major des Antiquailles.* The two passages were closed by continuity of the skin, the porches of the ears were very imperfect; nevertheless deafness was not complete. The application of caustic potash on the place where the auditory passage should have been, has already so far improved his hearing, that the young patient hears almost as well, as if he had never had the defect, so little is it necessary to approach him.

† Historia Cophoscos. Vindobonae, 1778.

× May not there have been a history of deafness further back, grandparents or others? Cause of alternation naturally is obscure.

of whom is deaf from birth; the second hears very well; the third is deaf, and so on alternately. Deafness cannot be regarded as hereditary with these children, since the father and mother enjoy their hearing in a very perfect state.* ×

3d. In the interior of the cranium, any thing which may compress the auditory nerve, at its origin or along its course, and thus obstruct the influence of the nerve upon the auditory apparatus, may be regarded as a cause of deafness.

4th. Deafness, like gutta serena, is sometimes produced by inordinate seminal discharges. Sylvatius cites a remarkable instance of deafness supervening upon excessive indulgence in venereal pleasures.

5th. Lauzani speaks of a woman who became deaf whenever she was pregnant, and did not recover her hearing till after her confinement. She became pregnant four times, and

* To the above account we may add that of a family at Aix, in Savoy, consisting of seven children. The oldest is deaf and dumb, the second hears perfectly, the third is deaf and dumb, the fourth is as fortunate as the second; the fifth, sixth, and last are perfectly deaf. The eldest of the family, a male, is paralytic in his inferior extremities. He is now at Lyons, as is also one of his sisters, at the Institution of the Deaf and Dumb, conducted by M. Comberry. The last, but one, of these children, is an idiot. It should be remarked, that the father and mother enjoy very good health, and have none of the infirmities of that numerous and unhappy family. There are also in the Institution of which we speak, many pupils who have, among their brothers and sisters, one or more deaf and dumb, and whose parents are exempt from that affection.

The town of Bessenay, in the department of the Rhone, furnishes an instance of the same kind. In a family composed of eight children, four are deaf and dumb, and, as in the preceding instances, they alternate with those that enjoy the sense of hearing.

These observations might be still further extended, but I think it will be difficult to give a satisfactory explanation, or to form a theory from such data. Nevertheless these facts ought to be preserved in the march of science, were they useful merely to indicate its proper limits. Th. P.

as often experienced this inconvenience. The same author relates the case of the wife of a peasant, who, during gestation, besides deafness, was subject to sciatic pains and to ulcers of the legs. All these evils disappeared immediately after her delivery.

6th. Worms in the stomach and intestines also produce deafness.

7th. Hypocondriacs, whose digestion is impaired, and who often suffer gastric derangements, are subject to become deaf. Must we believe, with Etmeller, that deafness, in such cases, consists in a spasmodic tension of the tympanum, or other membranes of the ear? This much is certain, that many cases of deafness have been cured by merely the repeated employment of purgative medicines.

8th. Deafness is a frequent symptom of adynamic and ataxic fevers. It is generally regarded as a favourable symptom when it happens on a critical day.

9th. Deafness has been known to follow a violent paroxysm of sneezing. Vagner relates, in the Memoirs of Natural Curiosities, that a literary man, having made use of some sternutatory powder, became incurably deaf in the right ear.

10th. A violent and long-continued cough may produce the same effect. In the course of this work I cite an instance of this cause of deafness, from my own observation.

11th. Washing the head with cold water is a frequent cause of deafness. Cutting the hair, at a particular period of life, has produced the same infirmity.

12th. Chronic issues, suddenly suppressed by topical astringents, have also given rise to deafness.

13th. A violent and unexpected sound sometimes surprises the organ of hearing, so as to strike it deaf. To this cause we must refer the deafness of soldiers of artillery. They may experience a real disorganization of the ear. Richter, in his

Bibliotheque Chirurgicale, says, that they are not only liable to become deaf, but even to hemorrhage from the ears.

14th. Deafness is sometimes produced by blows and falls on the head. Authors are replete with observations relative to children becoming deaf from cuffs received at school.

15th. Every thing which may impede the free entrance of air into the eustachian tube, such as excessive swellings of the tonsils, of the parotid glands; polypus in the posterior nares, closure of the expanded orifice of the tube by ulceration of the fauces, or merely by inspissated and tenacious mucus, which adheres to the posterior nares, are so many causes of deafness.

This disease may depend upon morbid changes in the external parts of the auditory apparatus. The causes of this variety are numerous, but it is not my design to speak of them here.

The diagnosis of deafness is difficult, in the same degree that the cause is hidden and obscure; thus, injury of the cavity of the tympanum and the parts contained therein; the affections of the labyrinth, and those of the acoustic nerve, are still concealed from us by a veil of obscurity.

The prognosis is attended with the same difficulties. We cannot pronounce it, in a case under consideration, but in a conjectural manner. It is true, however, that I have observed in many persons affected with difficulty of hearing, and even with deafness, (of which the cause was unknown to me,) that after the buzzing noise has ceased, the organ of hearing recovered completely, or in a great degree, the faculty of hearing. Generally, hearing is restored in proportion as the buzzing noise diminishes; but sometimes the latter ceases whilst the deafness persists in the same degree, although, after some time, hearing may be restored and become established, even in persons advanced in life.

If the causes and symptoms of deafness are so little understood, we ought chiefly to ascribe the fact to want of knowledge of this morbid anatomy, which is only to be acquired by dissection. It is to be desired that physicians to institutions of deaf-mutes should practice the dissection of the ear in all the deaf-and-dumb who die in those establishments; and that they should semi-annually give the greatest possible publicity to their researches. Till then there can be nothing but uncertainty in our acquaintance with the causes, and nothing but obscurity in the symptoms of the diseases of the internal ear; consequently, improvement in their treatment will be slow and laborious.

The ancient physicians treated deafness with topical remedies and with powerful purgatives. Celsus and his cotemporaries employed the juice of the wild cucumber, the tincture of myrrh, frankincense dissolved in woman's milk, poppy juice, rose-water, tincture of castor, &c. &c., which they dropped into the external auditory passage. They made use of purgatives, highly drastic, such as elaterium, hellebore, &c.

Modern medicine employs modes of treatment much more varied, but it is not much more successful. It prescribes musk, camphor, introduced into the external auditory passage. Some introduce, through the same passage, the oils of sweet and bitter almonds, those of the kernels of the peach, and of rue; oil in which ants have been infused; water which distils from the green branches of the ash; injections of the mineral water of Balaruc—of Bagneres—of Barége, &c. &c. Some establish issues, as those of the seton, caustic, blisters, &c.

A Bavarian bath-keeper, mentioned by Sckinkius, devised a singular method of curing deafness. He plunged the patient into a warm bath, to produce turgescence of the little veins which run behind the ear. When these were sufficiently apparent he opened them with the point of a lancet and drew

a considerable quantity of blood, to the great relief of the patients on whom he practised the evacuation. This remedy may have some success in cases of sanguineous plethora of the organ of hearing.

Purgatives are remedies eminently useful in some cases of deafness; so much so that, according to Truka, they ought to be employed in all cases, except those of debility.

Penot and Lazare prescribed fomentions, to be applied to the head, with warm mineral sulphur-water; the latter also recommended aromatic fomentations to the same part.

Pierre Castro, first physician to the Duke of Mantua, employed a mode of treatment which he devised for cases of complete deafness. I shall speak particularly of it when I shall come to treat of lesions of the acoustic nerves.

Within about thirty years anatomy has made considerable progress. By giving a more particular and exact description of the parts which enter into the structure of the internal ear, it has thrown light upon the mechanism and functions of each of these parts, and has suggested, for the cure of deafness, the following modes.

Riolan has proposed the perforation of the mastoid process for the purpose of introducing medicines into the interior of the ear. M. Jasser was the first who practised it.

In 1724, M. Guyot, *maître des postes*, at Versailles, contrived an instrument with which he thought he could inject liquids into the eustachian tube, by introducing the instrument through the mouth.

In 1732, Messrs. Wathen and Cléland, English surgeons, presented to the Royal Society of London, a flexible and hollow sound by means of which they introduced medicines into the interior of the ear, conveying the instrument through the nasal fossæ, and thence into the expansion of the eustachian tube.

The celebrated Sabatier also invented an instrument for the same purpose, but he confessed that he had never tried it on the living subject.

In 1811, I devised certain instruments proper for sounding the custachian tube, by the way of the nares. By means of those instruments I convey into the ear certain liquids, the nature of which varies according to the exigency of the case.

Natural philosophy, as well as anatomy, also furnishes us with certain means for the treatment of deafness—such as electricity, galvanism, mineral and animal magnetism. The two first have been too much magnified, by encomiums on their utility. As to the last, they have had but an ephemeral reputation.

We shall still comprehend, in the class of remedies which natural philosophy has furnished, the perforation of the membrana tympani; because that operation tends to re-establish the equilibrium of the air contained in the cavity of the tympanum, with the column of atmospheric air which enters into the meatus auditorius—an equilibrium interrupted by obstruction of the eustachian tube. Mr. Cooper was the first who performed that operation.

All the modes of procedure which I propose to offer, will be described and discussed in the course of this work.

ESSAY

ON THE

DISEASES OF THE INTERNAL EAR.

For the sake of arrangement, in treating the subject with which we are to be occupied, I have thought it expedient to classify the diseases which affect the internal ear, and which may become causes of deafness. I name them in the following order.

First. Diseases of the membrana tympani.

Second. Diseases of the cavity of the tympanum—of the muscles and small bones which are found there.

Third. Affections of the interior of the eustachian tube.

Fourth. Diseases which affect organs adjacent to the tube.

Fifth. Diseases of the labarynth.

Sixth, and last. Diseases of the auditory nerve.

Each of the above classes will be the subject of a distinct section.

SECTION I.

DISEASES OF THE MEMBRANA TYMPANI.

This septum may be, on the side of the auditory passage, overspread by a fungous pellicle—may become thickened by some degree of inflammation, or by a polypus attaching itself to the external surface. It may be relaxed and protruded either into the meatus auditorius externus, or into the

cavity of the tympanum. Sometimes it is too tense; inflamed, ulcerated, ossified, cartilaginous, or perhaps it is altogether or partially wanting.

"It is but a short time," says Rosenthal, "since I had occasion to examine, at Breslau, the body of a deaf-mute whose deafness had occurred in consequence of small-pox. I found the membrane of the tympanum relaxed and thicker than usual—the auditory nerve also appeared to be harder than common. In other respects all the parts of the internal ear were perfectly well organized."

CHAPTER I.

On the fungous membrane which covers the membrana tympani.

"The membrana tympani, in new-born infants," says Leschevin "is overspread, on the side of the meatus auditorius externus, by a very thick fungous membrane, which soon disappears in consequence of suppuration. Whenever it happens that this membrane remains adherent to that of the drum, instead of being separated from it, as commonly happens, it will necessarily occasion deafness."*

May not this have been the case with the deaf-mute of Chartres, whose history is reported in the Royal Academy of Sciences of Paris, 1703, and who began to hear at the age of twenty-four years after the occurrence of suppuration in both ears? The deaf-mute of whom Riolan speaks, who recovered his hearing after perforation of the membrane with a tooth-pick, was undoubtedly in the same condition.

M. Le Bouvyers Desmortiers cites an instance very similar to the two preceding. "At Nantes, (year 7,)" says that

* Prix de l' Académie royale de chirurgie, tom. iv, in 4to. pp.

author, "there was a man deaf and dumb from birth, aged twenty-eight years, who then heard and spoke very well, without having been treated with any remedies. Here is then a second phenomenon, equal to that of the young man of Chartres. We should be glad to know whether there are not many others that have escaped our notice, for want of witnesses capable of making them known to us?"*

M. Le Docteur Portal raises doubts in regard to the existence of this membrane. "It is not possible," says he, "to ascertain the fact in infancy. The suppuration is said to be very imperceptible. I can also state another reason. When suppuration occurs the pus blends itself with the cerumen of the ear, and hence it is difficult to distinguish it. It is necessary, in order to remove all doubt in relation to the subject, that the child should never be from under the observation of the physician or surgeon, and that they should examine the whole auditory passage, and the nature of the wax, which, during suppuration, is changed in its natural colour, and has a strong odour, as well as the auditory passage; but" adds the author, "all these observations are difficult to make," (he might say impossible,) "because of the number of circumstances that are often opposed. It is necessary to wait for a more advanced period, that is, when the child can make known to us that it hears or not."†

It is certain that this fungous membrane may, in some subjects, exist at the time of birth, as the membrana pupilaris is found to exist in some others.

Granting that this be a cause of deafness, it cannot be difficult to recognise it. By exposing the ear to a strong light, and directing the rays of the sun into the meatus auditorius,

* Considerations on congenital deaf-mutes.

† Précis de Chirurg. part. p. 477 et 478.

the bottom of the meatus will be very easily seen, where the false membrane adheres to that of the tympanum. If the bottom of the meatus be of a pearly white, smooth, and very sensible to the touch of the probe, we may be certain that the membrane is covered by no obstruction. But if it appears red, fungous, but little, or not at all, sensible to the probe, we may be assured that the false membrane exists.

Leschevin proposes two modes of destroying it. One consists in causing it to suppurate, by irritating the part with acrid medicaments; the other, in causing the false membrane to wither and to separate by desquammation, by touching it with mild corrosives, of dry consistence, as the kali purum, applied cautiously. Leschevin gives the preference to the latter method, as it appears to him to be attended with least inconvenience.

Both appear to me to be equally dangerous, inasmuch as these irritating substances may give rise to a considerable degree of inflammation, which the surgeon is not always able to arrest, nor even to restrain; hence may arise a deep suppuration, which may destroy the membrana tympani, reach the drum, and produce the most serious results. At other times, these means, if they affect the false membrane but slightly, will prove ineffectual; for, instead of causing the separation of that kind of foreign substance, either by suppuration or desquammation, they confer upon it a greater degree of thickness and consistence. At least this happens (if we may reason from analogy,) to those false membranes which form upon the globe of the eye, when we treat them with similar means.

Two facts, derived from Frabricius of Hildanus, prove how dangerous it is to introduce irritating substances into the auditory passages.

A child, eight years of age, had a discharge from the ears—she was placed in the hands of an empyric, who injected into them an oily fluid, which produced intolerable pains. These pains rapidly increased—inflammation, fever, and delirium soon supervened. A physician allayed these symptoms by the employment of suitable means, but deafness made rapid progress, and at the age of twenty-four years the young person was insensible to the loudest sound.*

Another child six years of age, introduced into her left ear a glass bead, of the size of a pea. Many fruitless attempts were made to extract it. From that time the patient was tormented with continual pains in the ear—these abated, but were occasionally increased by cold and moisture.

At length the child experienced a slight degree of numbness, which gradually increased, first in the left arm, then in the hand, next in the leg, and finally in the whole side. A dry cough persisted after this occurrence. The patient suffered attacks of epilepsy, and the arm became atrophied. All these symptoms immediately ceased on the extraction of the bead.†

The accidents mentioned in the above cases, although they were not the result of caustic, applied for the removal of the fungous membrane adherent to the membrana tympani, are nevertheless conclusive, in regard to my opinion; for it is difficult, not to say impossible, to introduce any caustic, so as to excite irritation in the false membrane, without communicating irritation to the meatus auditorius—to the membrana tympani, and thence to the interior of the ear.

From these considerations, I shall give preference to perforation of the tympanum over the method proposed by Leschevin, because it appears to me less dangerous, and because

* Fabrice de Hilden, cent. 5, observation 5 † Ouvrage cité.

it restores the patients hearing more promptly than other methods, as is proved by experience and observation. To prevent the closing of the aperture, a small portion of gum elastic sound should be introduced, which operation must for a time be repeated every day.

CHAPTER II.

On polypus growing upon the external surface of the membrana tympani.

The auditory passage, like all cavities which are lined by a mucous membrane, is subject to polypus excrescences. Hence the membrana tympani is subject to the same, because its external surface is overspread by the mucous membrane of the same passage. Authors make frequent mention of polypi which grow upon the walls of the external auditory passage, but no one, so far as I know, speaks of polypus arising from the membrana tympani, and which increases to such a degree as to obstruct the passage and produce deafness.

The causes which may produce these excrescences are very numerous. Every thing, which irritates and produces inflammation and ulceration of the mucous membrane, may give rise to polypus. Thus it is that an ear-pick, introduced frequently and rudely into the auditory passage; scabies, scrofula, measles, scarlatina, small-pox and syphilis, give rise to inflammation, ulceration, and by consequence, polypus.

M. Alibert, in his *Therapeutique Medicale*, speaks of a young man who had become deaf from excrescences which had been produced by syphilis. The author does not say whether these excrescences were of a polypus kind.

Adynamic and ataxic fevers often terminate in deafness, which is sometimes accompanied by long and obstinate sup-

puration; hence arises polypus. The following case confirms what I assert.

M. M***, twenty-two years of age, came to consult me, May 1st, 1817; he was affected with deafness of the left ear, of which the immediate cause was a polypus, also with difficulty of hearing in the right ear. These disorders were accompanied with suppuration and a buzzing sound in one or the other ear. They supervened on an adynamic fever, which the young man had suffered at the age of twelve years. Injections of *eau de Balaruc*, thrown into the auditory passage caused the polypus to drop off.

The substance had the form, colour, and consistence of a strawberry; and it was attached to the membrana tympani by a very slender pedicle. On examining that membrane I discovered near the middle a reddish point of the size of a small lentil, where I was persuaded that the pedicle of the polypus had been attached.

The separation of the excrescence was followed by a slight hemorrhage which spontaneously ceased, without the necessity of my employing any means to suppress it. The suppuration and the buzzing sounds have ceased, and the hearing of that ear is completely re-established. All this was simultaneous with the removal of the polypus from the meatus auditorius.

The symptoms of this form of disease are easily ascertained; a single examination is sufficient to determine the existence of the polypus in the auditory passage. But it is not thus easy to ascertain the precise point where it is attached.

Nevertheless, whatever may be the point at which the polypus is attached, that circumstance need not influence the treatment, which consists in the employment of the following means:—twisting it off; removing it with the ligature, cutting

instrument, actual cautery, or caustic. All these means are useful; each being preferable under particular circumstances.

We find in Scultet* the history of a polypus of the ear which had caused deafness by completely filling the auditory passage, and which was, in part, cured by tearing it away, and in part by the application of the actual cautery.

M. Leschevin† has seen a young girl suffering from a similar excrescence, implanted very deeply in the auditory passage, and which issued from it more than half an inch. This excrescence, which Leschevin regards as a true polypus, was fungous, and gave out a fetid purulent discharge from its surface. The author removed it by laceration and saw no more of the patient.

CHAPTER III.

On relaxation of the membrana tympani.

This affection varies in correspondence with the causes which produce it; these causes are very numerous,—such as humidity, together with a south wind; catarrh of the meatus externus and of the cavity of the drum; damp air; water dashed upon the membrane; a serous efflux from the ear. Plater, Langet and Scarpa, witnessed these abundant discharges, and regarded them as important.

With young women, chlorosis, to a certain degree, is another cause of relaxation of the membrane of the tympanum.

Sauvages‡ relates the case of a girl of pale complexion, very dull and uncultivated, who had had, for some time, a dif-

* T. 2. p. 605, edit. d'Amsterdam, 1741.

† Prix de l'Acad. de Chirurg. tom iv. 1. re partie.

‡ Nosologie, tom. ii, page 217.

ficulty of hearing. She took, for three months, the extract of henbane, beginning with a third of a grain and increasing the dose, by little and little, to seven grains. This child, says Sauvages, heard very well at the end of three months and a half; she recovered her flesh and complexion.

Verduc thinks, on the contrary, that the use of cold and narcotic remedies, in diseases of the ear is a cause of the relaxation of the membrana tympani. This author, however, cites no fact to substantiate his opinion; and, besides, his reasoning is contradictory, a circumstance which does not inspire confidence. "If we make," says Verduc, "very great use of refrigerant and narcotic medicines, in diseases of the ear, the covering of the drum will certainly become very dry and very tense."

Finally, relaxation of the tympanum may also depend upon disease of the muscles of the cavity. Valsalva, in his observations, cites examples of it. Defect of action in the internal muscle of the malleus produces relaxation of the membrana tympani. This defect of action, according to Leschevin, may arise either from rupture of the tendon of the muscle, by a violent concussion of the membrane, such as is produced by sneezing, the nose and mouth being shut; or by the destruction of this little fleshy body, by an abscess of the tympanum; or, finally, by paralysis of the same muscle. May it not have been this last affection which occasioned relaxation of the tympanum and by consequence that singular deafness of which Willis reports two instances.

The first is of a woman who could hear only when some one beat a drum at her ear.

The second, essentially like the other, is of a man who never heard the voices of those who spoke to him, but when the bells of a steeple were rung, near which he lived. Willis, with much judgement, ascribes this species of deafness to relaxa-

tion of the membrana tympani; but he neither points out the cause nor the remedy.

The symptoms of this affection are derived—1st. from the causes which may have given rise to them; 2d, from hygrometric phenomina of the atmosphere; 3d, from the nature of the prevailing wind; 4th, from the action of remedies upon the injured part.

If, after catarrh of the external auditory passage, and that of the cavity of the tympanum; or, after dropsy of this last cavity, the patient experiences difficult hearing, we shall have cause to believe that the indisposition depends upon relaxation of the membrane of the tympanum, or upon palsy of the internal muscle of the malleus, (*tensor tympani*). This presumption will receive new assurance if the deafness is observed to be augmented during a damp season, and diminished when the weather is dry. We shall be still more confident of the existence of relaxation, if the south wind, and a tempestuous season, render the patient still more deaf, while the north wind produces the opposite effect.

Finally, there will be complete certainty, if, independantly of the symptoms which we point out, it happens that dry substances, warm and tonic, introduced into the external auditory meatus, give some degree of power to the faculty of hearing; for it will be evident from this that the deafness depends on relaxation of the septum of the tympanum, and not on a lesion of the acoustic nerve, (as some symptoms manifested might lead one to suppose) because the means are sufficient to restore the tone of the membrane, whereas their influence is nothing upon the auditory nerves.

In order to determine the diagnosis of this disease, there is one thing more to be explained, that is, the case in which the relaxation may be occasioned by paralysis, or rupture of the internal muscle of the malleus or that of its tendon. If, after a

fit of coughing or violent sneezing, or strong effort in blowing the nose, the individual experiences, in the interior of the ear, a slight, instantaneous pain, accompanied with a tingling sensation, and with difficulty of hearing, and there is no sign which indicates a perforation of the membrana tympani, then we must attribute the relaxation to one or the other of these ruptures, especially if the means proper for restoring the tone of the membrane, of the tensor-tympani, and of the acoustic nerve have been ineffectual. This will show that the relaxation depends on one of the causes of which we speak; the disease is then incurable.

To treat successfully, relaxation of the membrana tympani, it is necessary, as in all other diseases, to pay attention to the cause which may have produced it. I will not enumerate, in this place, all the means which the ancients, or even the moderns have employed, among which it must happen that there are many very good, but also many very useless or even ridiculous. I shall speak only of the former.

If the relaxation depends upon a catarrhal affection, Duverney advises fumigations of the external auditory passage with the vapour of the carduus benedictus, (*chardon-bénit*) or with a decoction of the iris of Florence, marjoram, balm, anise-seed or fennel; the juice of marjoram dropped into the auditory passage.

Barbette employs a decoction of cloves in red wine, of which he introduces a few drops into the auditory passage, which he then fills with a clove.

All these means may be attended with happy effects, in cases which we have designated and in which the relaxation depends upon humidity of the atmosphere.

In similar cases, fumigations of juniper berries, and of laurel consumed upon burning coals, will be beneficial. Injections of the decoction of cinchona have, with me, been benefi-

cial; but I would not have too much confidence placed in this remedy, because of its astringent property, which tends, if we may so say, to tan the membrane.

If the disease of which we speak be caused by chlorosis, we must first relieve that affection; then, if the relaxation of the membrane persists, recourse must be had to the remedies which we have pointed out.

We have said that the relaxation which arises from rupture of the tensor-tympani, or its tendon, is incurable; but this is not the case with regard to that variety which proceeds from paralysis of the muscle. In the latter case Leschevin recommends to introduce into the cavity of the tympanum, through the eustachian tube, some spirituous and aromatic vapour, by causing it to be breathed through the nose, and directing the patient to chew substances impregnated with stimulating and aramatic particles.

It is obvious, though I were not to mention it, that these means are by no means sufficient to convey effectually these medicaments into the diseased part. We shall derive very great advantage from lotions of the mineral water of Balaruc, of Barége, &c., introduced into the cavity of the tympanum by means of the hollow sound which I have invented.

CHAPTER IV.

On the sinking or protrusion of the membrana tympani, in the form of a pouch, (cul-de-lampe), *either into the meatus auditorius or into the cavity of the tympanum.*

The causes of deafness are innumerable, and every day we discover those which are new. For example, authors make mention of relaxation of the tympanum with protrusion into the meatus auditorius; but no one, so far as I know, has spo-

ken of the sinking of this membrane into the hollow of the tympanum. I will relate an instance of it in the person of a priest of this city.

M. l'Abbé L****, aged sixty-two years, had been deaf with the right ear since the age of six, but with the left ear he had enjoyed very exquisite hearing. It was not till the beginning of the year 1816 that this organ became affected with very great difficulty of hearing, (dysécée), which obliged him to abandon some of the duties of his calling.

The deafness had evidently been altogether produced by a violent and protracted cough.

M. l'Abbé L**** had been affected for three months, with this degree of deafness, when, April 27th, 1816, he came to place himself under my care. He heard only when a person spoke to him in a loud voice and very near, and when conversation became general, he could take no part in it. He could not hear the beating of a watch but when it was very closely applied to the porch of the ear. He experienced a sensation like that which a foreign body would produce, lodged in the cavity of the tympanum, and also felt, in the part, a disagreeable pulsation. On attentively examining the auditory passage, I perceived that the membrana tympani was depressed, and formed a pouch in the cavity of the tympanum. From that time I had no doubt that this was the immediate cause of the deafness of the ecclesiastic. The cure of this disease consists in re-establishing the natural form of the membrane. This may be accomplished by means of injections, conveyed into the cavity of the tympanum, through the eustachian tube. The first trial of it has been sufficient to restore hearing.

A circumstance which may contribute to the progress of the science, and which, for that reason, I am unwilling to pass over in silence, is, that we must discontinue all injections, and especially abstain from introducing them into the external meatus,

as soon as the membrane has recovered its natural form, and hearing is restored; otherwise the disease will be reproduced as it was before the treatment. This happened to me, in regard to M. l'Abbé; at the second or third sitting, I made a few injections into the meatus externus. The next day my patient told me, with an air of discouragement, that he was as deaf as before the treatment. I then perceived the unfortunate error which I had committed; but at the same instant I conceived the hope of immediately repairing the mischief. Indeed a few injections through the eustachian tube have sufficed to restore the membrane, and consequently hearing, to their natural state.

At the first glance, the cure of this malady seems to be altogether mechanical, but I believe that the water of Balaruc by its tonic virtue, ought to be regarded as of some account in the treatment.

When the membrane protrudes into the meatus auditorius it is very easy to distinguish the affection; mere inspection is sufficient.

The causes which produce it are—1st, coughing, violent inspiration, and sneezing (lest any one should accuse me of inconsistency, these causes may really produce the contrary effect, of which I have cited an instance in this chapter); 2d, more frequently, this protrusion of the membrane is owing to an accumulation, sometimes of mucus, sometimes of pus, sometimes of rarified air, contained in the cavity of the tympanum.

In the latter case it will suffice to depress the membrane slightly with a blunt probe, and to stuff gently the external meatus with cotton or lint, which should remain for forty-eight hours. After removing this simple application, the mineral water of Balaruc should be injected twice or thrice,* luke-

* This water possesses tonic qualities; and also, by virtue of the salts which it contains, slightly stimulates the organ. We, of course, cannot

wārm; or indeed a weak infusion of cinchona of the same temperature. Then it is to be dressed as above. Six or eight days suffice for a cure.

CHAPTER V.

On morbid tension of the membrana tympani.

Duverney and Leschevin ascribe preternatural tension of the membrana tympani to violent diseases of the head, and to certain fevers which tend to produce phrensy.

To these general causes we ought, as I think, to add inflammation of the fauces, imparted to the eustachian tube, for we observe in this case the sense of hearing to be morbidly increased. Indeed the slightest noise disturbs the patient; the north wind renders his situation insupportable, and that of the south relieves him.

The symptoms which characterise this species of disorder, and those which indicate relaxation of this membrane are opposite, that is to say, the patient hears better when the season is humid and when the south wind prevails, than when the weather is dry, and the north wind blows. He hears better when he is addressed in a low tone and near the ear, than when he is spoken to in a high tone.

If the tension arises from any one of the causes of which we have made mention, we should especially direct our attention to the primary disease, without, at the same time, neglecting the secondary.

obtain the article, but it is easy to devise something which shall produce a similar effect. I would recommend, for this purpose, a weak solution of the sulphate of zinc, or indeed a very weak one of corrosive sublimate, say in the proportion of one grain to two ounces of water. Some might prefer an astringent vegetable decoction. N. R. S.

Baths of the vapour of emollient decoctions, directed into the external meatus; dropping the same decoctions prepared with warm milk into the ear; the fresh oil of sweet almonds, conveyed to the bottom of that passage by means of a little cotton, produce very good effects. The topical application, should be repeated frequently during the day.

CHAPTER VI.

On inflammations of the membrana tympani.

The membrana tympani, like all other parts which possess blood-vessels and nerves, is susceptible of inflammation; that inflammation may be either acute or chronic. It is rare that it is confined to the membrane alone. It ordinarily attacks the mucous lining of the meatus externus; that of the cavity of the tympanum may participate in the disease.

Experience and observation prove that the acute inflammation of the membrana tympani most frequently terminates by resolution, sometimes by suppuration, rarely by catarrhal effusion; the last however is the ordinary termination of chronic inflammation.

The causes of inflammation of the membrana tympani are the same as those which produce inflammation of the external auditory passage; such as the presence of a foreign body, the too frequent introduction of an ear-pick, or any other irritating body.

I knew a young person who has the bad habit of constantly introducing a pin, quite to the bottom of the passage, under the pretext of cleaning the ear. From this, inflammation of the auditory passage and of the membrana tympani has already several times arisen.

The repulsion of the humour of itch, from the skin, may

also give rise to inflammation. It may also, like many other diseases, arise from an internal cause.

Acute pain, fever, painful sensations caused by the slightest noise, especially when the mouth is opened in masticating food, are the symptoms and indications which show acute inflammation of the membrana tympani.

Chronic inflammation is much less painful; generally, indeed, it is not all so, but it is accompanied with a mucous or serous excretion, and sometimes it itches in a troublesome manner. In the latter case there is always difficulty of hearing, because of the extraordinary thickness which the membrane acquires from continued inflammation.

Acute inflammation may be effectually overcome, without there being left any unpleasant consequences. This is not the fact, however, in regard to chronic inflammation, for it is rare that those who have been afflicted with it, do not retain a greater or less degree of deafness.

The extraction of the foreign body, preventing the individual from wilfully irritating the membrane; bleeding in the arm or foot, if inflammation depends upon general plethora; the application of leeches near the angle of the jaw, and under the diseased ear, if the plethora be local, are the first indications to be pursued.

If a repelled eruption, or an habitual discharge, unadvisedly suppressed, be the cause of inflammation, the indication will be to restore the eruption by the application of a blister. After having fulfilled the first indication, the following means, whatsoever may be the cause of the inflammation, are to be employed.

Emollient vapours, such as those of a decoction of mallows with milk, introduced, as a bath, into the auditory meatus; those liquids dropped warm into the same part; the application of emollient and anodyne poultices, immediately to the

porch of the ear, after having filled the meatus with cotton, moistened with the warm fresh oil of sweet almonds; sinapisms to the feet, and emollient enemata, ought not to be omitted. The regimen will be more or less severe, according to the intensity of the symptoms. Chicken water, whey, or some other lenitive and cooling liquid, should be the ordinary drink.

Such is the treatment proper for acute inflammation, which sometimes terminates in suppuration. When this is the case, it is necessary to make use of detergent injections, such as those of barley-water with honey, a decoction of briar leaves, the mineral water of Balaruc, or that of Barége, &c. &c.*

As to the chronic inflammation, it is to be treated in the same manner, with, however, some modification of the means proposed. Blisters and caustic issues are here indicated, to be applied to the neck or arm, and never upon the region of the mastoid process. Among the number of bad effects that I have seen result from the latter practice, I will merely report the two following.

Th. S***, was attacked with rheumatic pains in the left ear, after having passed many nights on guard, during the siege of Lyons.

The pain ceased, but there remained a considerable degree of buzzing noise in the ear, and difficulty of hearing. Some one applied a blister over the mastoid region. The result was

* No one can read the above paragraph, and its context, without being struck with the contrast between the scientific precision of French pathology, and the imbecility and diffusiveness of some part of their practice. In case of suppuration occurring in the membrana tympani, the practitioner, instead of lamenting that he has not the water of Balaruc or Barége, may deterge the ear with a weak alkaline solution, and when the inflammatory excitement has abated, may employ in the same manner a weak solution of sulphate of zinc, sublimate, or nitrate of silver. N. R. S.

an increase of the buzzing sound and of the deafness. Not satisfied with his condition, M. S*** consulted M. M***, who healed the blister, and applied another to the arm of the side of the diseased ear. The patient is perfectly cured of the buzzing sound and of the deafness.

Madam G***, grocer of this city, after an accouchment in 1804, had an inflammation of the external auditory passage in both ears, and particularly of the membrana tympani. Notwithstanding a great number of remedies, the inflammation was protracted and obstinate, and yielded only to a caustic issue applied over each mastoid region. To the inflammation, there succeeded a degree of deafness, which every day grew worse. The patient informed me that she had perceived the deafness from the very first day of the application of the caustic. From facts derived from my own practice, and those with which my professional brethren have furnished me, it is certain that blisters, and especially issues, applied over the mastoid processes, produce congestions in the mastoid cells, in place of relieving them, and hence these drains become causes of deafness.

CHAPTER VII.

On induration of the membrana tympani.

It sometimes happens that this membrane becomes indurated,* being either cartilaginous or bony.†

These affections may arise; first, from inflammation;‡ second from tumefaction of the glands of that septum, an affection which Bartholin declares to be very common in persons affected with abdominal dropsy; third, from the venereal virus; fourth, from the abuse of spirituous liquors, as has been observed by Hoffman; fifth and lastly, from old age.

We may ascertain the existence of induration of the m. t. by the following signs:

1st. By deafness more or less complete; 2d, by diminished sensibility of that membrane, when it is merely hardened, but if it is cartilaginous or ossified, it is altogether insensible to the touch of a probe; 3d, by the want of elasticity and resistance which it opposes to the probe, and, if it is ossified, by the sound which it emits when we strike it with the instrument; 4th, Savauges§ observes, that if induration of the membrana tympani proceeds from the venereal virus, the expansion of the ear is covered with scales which are easily detached, leaving the organ red.

This symptom appears to me to be equivocal, for, if the disease arose from predisposition to tetter, the same phenome-

* Duverney, Traité de l' organe de l'ouïe, p. 176.

† Loseeke, Obs. anat. chirurg. med. p. 24, 25.

‡ We know that membranes which have been for a long time inflamed, retain, after the resolution of the inflammation, a much greater thickness than they had before. The membrana tympani may become thickened in the same manner.

§ Nosologie, tom. 2, in. 8.

non would manifest itself in a more remarkable degree. In relation to this subject, I recollect that, when I was surgeon in ordinary to the Hôtel-Dieu de Lyon, I had occasion to see many persons affected with tetter, some of whom were completely covered with the disease; the nails of the hands and feet were thick, hard, and of a dirty white colour; the ears were red and scabby, and hearing was difficult.

When the disease of which we are speaking is not much advanced, which may be known by the degree of sensibility which the membrane still possesses, and by the organ not having altogether lost its faculty of hearing—if things are in this state; and, for example, the cause of the disease is referable to venereal virus, we should commence the treatment of syphilis, while, at the same time, we should not lose sight of the local disease. A blister should be applied to the arm on the side of the diseased ear, and be kept open for some time, and if the case requires it, a caustic issue should be substituted. At the same time we may employ, with advantage, injections of the infusion of the flowers of violets, or of mallows, with which a few drops of the liquor of Van Swieten have been blended, into the auditory meatus.

If tumefaction of the glands of the membrane be the cause of this induration, whether it be the effect of a strumous or of a dropsical habit, in either case, besides encountering the principal disease, we should establish a caustic issue on the arm of the affected side. In the latter case, we should inject into the auditory meatus warm water, to which a few drops of ammonia have been added. These injections will stimulate the glands agreeably, and favour their resolution.

When the membrana tympani has acquired a degree of thickness, and especially when it is ossified, all general and topical remedies are useless. The first may indeed remove the original cause, but the effect will remain. For this reason

M. Leschevin* says, that if the thickening has become so considerable as to intercept the vibrations, of the air, art cannot repair the defect. M. Portal is very nearly of the same opinion; he says, "if the thickening of the membrane is considerable, this variety of deafness is as incurable as that of old persons;" but he adds—"It remains to be learnt whether it would not be warrantable to make a small perforation in the membrane.†

Thus that celebrated professor anticipated the success which should one day attend the operation of perforating the tympanum, in certain cases of deafness. It is proper, exclusively of other means, in the case in which he has proposed it; provided always, that the induration, or ossification, arises not from the progress of age.

The idea of piercing the membrana tympani, for the purpose of restoring hearing to the deaf, was conceived by the celebrated Chesselden. I have just stated that Professor Portal proposed the same operation more than forty years since.‡

* Prix de l' Acad. roy. de Chirurg. tom. iv. in—4, 1. re partie.

† Precis de chirurg. pratique, tom 2, p. 480.

‡ It will, perhaps, not be improper to suggest here, that, in order that hearing may be perfect, and that the membrane may execute its functions freely and perfectly, it is necessary that it be constantly placed between two columns of air in equilibrium with the atmosphere, and each communicating freely with it. This, in the natural condition of the organ, is effected, on the one hand, by the eustachian tube, and on the other by the external meatus. If, by any accident, the eustachian tube happens to be obliterated, or only obstructed, the air contained in the cavity of the drum loses its elastic quality and its vital property; qualities without which this fluid cannot be in equilibrium with the atmospheric air, as it was before the accident. In that case, it is necessary to restore the equilibrium, between the two columns of air, by restoring the functions of the eustachian tube, which, till recently, was regarded as very difficult, or even impossible. Hence, undoubtedly, arose the idea of opening a communication between the air contained in the cavity of the drum and the external air

Mr. Cooper, the English surgeon, appears to have been the first who practised the operation proposed by the two distinguished men whom we have quoted above. Since Mr. Cooper, many French and German practitioners have employed this method; among the first, we notice M. M. Celliez, Maunoir, and Itard. The last has added, with advantage, injections, which he introduces into the interior of the ear, by means of the artificial opening made through the membrana tympani.

Mr. Cooper recommends the perforation of the membrane, in case the eustachian tube is obstructed or imperforate, in order to establish a communication of the drum with the atmospheric air, and thus to restore the vibrations of the membrane of the foramen rotundum, and the play of the stapes, the base of which covers the foramen ovale.

Mr. Cooper's operation consists in introducing into the external auditory passage a small trochar, contained in a canula. When the extremity of the canula touches the membrana tympani, he pushes forward the trochar. The instrument should be adjusted in such a manner, as that the instrument cannot pass more than a line and a half, or thereabouts, from the extremity of the canula. "The place most convenient for the perforation," says Mr. Cooper, "is at the anterior and inferior part of the membrane, below the handle of the malleus, which must not be touched."

"Although the membrane is vascular," adds the author, "its vessels are so small that they yield but very little blood. If a considerable quantity is observed to issue, we may conclude that the operation is not properly done."*

which fills the external auditory meatus, by perforating the membrana tympani.

* Biblioth. Germ. tom. viii. pp. 400 et 401.

Mr. Cooper relates four cases in which his operation was attended with success. Among these cases there is one, the subject of which was a young man of 17 years, deaf and dumb from birth. Mr. Cooper ascertained that this young man had a defect of the throat, which rendered him unable, by blowing the nose, to force air into the ears, the eustachian tubes having no orifices towards the throat.*

I shall not here examine upon what circumstance the theory of the author is founded, but it is important to direct our attention to the operation itself, and its results.

1st. Is the operation proposed by Mr. Cooper always practicable?

2d. Are we sure of reaching the spot indicated by the author?

3d. In cases approved by Mr. Cooper, will the operation always be followed with success, provided the operation be done in the manner prescribed? The above are questions which it is important for us to examine.

1st. There are but few circumstances which can prevent the perforation of the membrana tympani. I can discover none, indeed, but polypus or fungous, which can present any obstacle to the operation.

2d. The preferable place for operating, pointed out by the author, will be attained with difficulty, whatever may be the information and dexterity of the operator. The motions of the patient, the very small distance that there is between the part which is to be perforated and that which is to be avoided, present obstacles which must be with difficulty overcome, and, consequently, will in some degree defeat the success of the operation.

* It is to be desired that Mr. Cooper had said how he ascertained the fact.

If we consider, indeed, that the membrana tympani is scarcely more than two lines and a half in its greatest diameter—that the malleus occupies more than a third of its surface, to the centre of which the handle of that little bone is attached, we shall perceive that it is almost impossible to accomplish the proposed operation without injuring the apparatus of hearing.

3d. The mere perforation of the membrane will be useless, whenever concrete substances, such as those of coagulable lymph, of extravasated and coagulated blood, or any other substance, may obstruct the cavity of the tympanum, the mastoid cells and the eustachian tube; because the solid matter which obstructs these cavities, not being susceptible of being evacuated by the simple perforation of the membrana tympani, opposes an insuperable obstacle to the ingress of the atmospheric air, which should come in contact with the foramina rotundum and ovale, a circumstance without which hearing cannot be exercised. A single instance is sufficient to prove the truth and accuracy of my assertion.

M. Itard, physician to the institution of deaf-mutes in Paris, performed, on the 2d of July, 1811, the puncture of the membrana tympani upon the person of a congenital deaf-mute, aged 15 years. It is not asserted that the young man heard from the time that the operation was performed. He did not hear until the repetition of injections into the ear had been practised for three months.*

It is obvious that, in this case, there was some obstruction in the cavity of the tympanum; for, if this cavity had been free, the young man would have heard from the time that the operation was performed. Now I ask, whether, in this case, simple puncture of the membrana tympani would have sufficed to

* Journal de l'Empire, 31 Octobre, 1811.

make this deaf-mute hear? I believe that the most decided advocate of this method would not presume to answer in the affirmative.

For myself, I think that, if Dr. Itard had not made the injections of which he speaks, the young man would have remained in his former condition.

Injections, by the eustachian tube, would have been perfectly successful in this case, and there would have been incurred none of the serious hazards, to which the puncture of the membrana tympani exposed him.

4th. From a precise knowledge of the relation of the malleus to the membrana tympani, we may safely predict that, in performing three punctures, at least one will touch this little bone, and perhaps even detach it; and thus the organ of hearing will be greatly injured; for, if it is true that the mere puncture of that membrane may be followed by deafness, as Duverney,* Leeat,† Haller,‡ le Dictionnaire des Sciences,§ &c. &c. assure us; as also experiments upon living animals prove, and the instance of artillery-men and bell-ringers, (I believe, however, that deafness in those persons arises rather from violent and repeated concussions of the whole organ of hearing, than from the mere rupture of the membrane,) what must be the result when the malleus is detached or damaged in consequence of the operation?

There are, I know, some instances of accidental perforation of the membrane, which have not produced complete deafness—which, indeed, have had but little influence upon the faculty of hearing; but I cannot think that these single and

* Traité de l'organe de l'ouïe, p. 61 et 62.

† Traité des sens, tom. 3, p. 146.

‡ Haller.

§ Dictionnaire des Sciences, tom. 15, in fol.

insulated facts should have more weight than the repeated experiments, and the numerous observations made by the most ingenious members of the profession.

Instances are cited, of smokers, who can force tobacco smoke from the mouth through the ears; but it appears to me that there is a distinction to be made between the work of nature, and that which is effected by disease, or by the hand of man.

Independently of the inconveniences with which we charge the method of Mr. Cooper, there is another which, without being severe to the patient, is very annoying to the operator—that is, the closure of the artificial opening which has been made.

M. Sabatier says, on the subject of the perforation of the membrana tympani: "Animals in whom the membrane has been perforated with an instrument, deeply introduced into the meatus auditorius, experience no other inconvenience than a degree of temporary imperfection in hearing, and soon recover their ordinary state, undoubtedly, because the opening thus made, promptly becomes closed as before."*

The experiments of Valsalva substantiate the conclusion of Sabatier. Valsalva perforated, and even lacerated the membrana tympani, in several dogs, which, after some time, he killed. In all, the wounds were cicatrized, and the membrane presented no opening.

M. Maunoir experienced this inconvenience in the person of M. F., in whom he perforated the membrana tympani of both ears. "Twenty days after the second operation," says M. Maunoir, "M. F. came to me. I examined his ears by a good light. The membrana tympani of the right ear was seen to be marked with a little cicatrix, toward the anterior part, and

* Sabatier. Traité d'anat. 2, p. 186.

a very small hole was just discernible in the centre. Hearing, however, was but little diminished. Fearing that this little opening might close altogether, M. F. desired that I would perforate the membrane again; an operation which I performed without pain to the patient, and also with some slight increase of sensibility in the ear."*

M. Celliez believed it possible to obviate that inconvenience by the aid of a curved trochar, of a diameter three or four times greater than that of Mr. Cooper, and of which the angles are sharper, "in order," says M. Celliez, "that the ragged margins of the wound, being larger and more freely cut, may fold back the better upon themselves, and thus render re-union impossible."†

But would not M. Celliez, in avoiding one evil, fall into one more serious? I fear so. If, indeed, with the trochar of Mr. Cooper, we incur the risk of detaching and even breaking the bony process of the malleus, what will be the hazard with that of M. Celliez? With such an instrument, I think that the accident would rarely be avoided.

In cases, in which the method of Mr. Cooper is the only means which can be employed, I should prefer his trochar to that of M. Celliez, giving, however, a slight curvature to the former.

Having learnt that the introduction of a trochar, armed with a silver canula, was difficult for the operator and painful to the patient, and that the opening made in the membrane was liable to close, I have devised the following improvements. For the silver canula, I have substituted one of elastic gum, which by its flexibility, adapts itself, without difficulty and without producing pain, to the canal through which it passes. The ca-

* Journal de Medicine, an. xiii.

† Ouvr. citē, même annēe et même mois.

nula is a line and a half longer than the shaft of the trochar, which is slightly curved, especially towards the point. The shaft of my trochar is a little larger than that of Mr. Cooper's; but it is less than the instrument of M. Celliez.

To prevent the subsequent closure of the opening made in the membrana tympani, I insert a piece of cat-gut, which enters about a line or a line and a half into the drum of the ear.

In performing the operation, the patient being placed in an easy chair, opposite to a good light, the head inclined toward the shoulder of the side opposite to that on which the operation is to be performed, and supported on the breast of an assistant, the canula is to be dipped in olive oil, and introduced by itself into the meatus extermes. When it touches the membrana tympani, which is known by the resistance that is felt, the trochar is to be gently conveyed into the canula, the curvature being directed downward and forward, in introducing the whole shaft. The puncture being made, the trochar and canula are to be withdrawn. Then the cat-gut is to be introduced, carefully dipped in the oil of sweet almonds. When it has reached the desired point, (which may be known by a mark made on the instrument with ink,) it is to be fixed with lint or charpie. Then the cat-gut is to be cut off even with the concha of the ear.

This dressing is to be renewed every twenty-four hours; and, at the first dressings, an injection or two of the infusion of the flowers of violets or mallows should be made, and afterwards injections of barley water, sweetened with honey.

I have twice practised this operation on the same individual, and on the same ear. The first time, the opening made by the puncture was completely closed in the course of from six to twelve days. As soon as I was sure that the first operation had not succeeded, I performed the second in the manner that I have described above, and the success was complete.

"Professor Dubois," says M. Richerand, "has performed the puncture of the membrana tympani four times without success, on subjects aged from thirty to fifty years. This inutility of the operation, proved by the four instances so well authenticated, will tend to make the correctness of other observers doubted—at least to show that one should not always promise himself success."*

I entertain, in that respect, the opinion of Professor Richerand, and I will also add, that there are a great many circumstances which may defeat the operation. In other cases success will be but temporary.† There will be but few cases in which it will be successful.

* Nosographie Chirurgicale, tom. 2, p. 132.

† If the operation is not attended with the success which one might expect; and if, most frequently, the patient does not recover hearing but in an imperfect manner, and for a short period of time, it proves clearly that the exterior air, freely introduced into the cavity of the drum, produces the effect of a foreign body, changes the sensibility of the very delicate ramifications of the auditory nerve, and hence effects a morbid condition of the other organs of hearing.

M. Deleau, Jun., who is engaged with much success in treating diseases of the ear, is the inventor of a very complicated instrument for making the puncture with loss of substance to the membrana tympani. It would be necessary to enter into too long a detail, to give a correct idea of the instrument; for this, therefore, we shall refer to the memoire which M. Deleau published in February, 1822. We will merely say, "that the part of the instrument designed for the operation, is composed of a steel canula, of which the extremity that is to touch the membrana tympani, has an opening, a line in diameter, and is cut obliquely, in order to be more perfectly adapted to that membrane, which has a similar direction relatively to the concha of the ear. The extremity of the canula is sharp, and receives in its whole length a mandrin, of which the extremity, which corresponds to that of the latter, presents two cutting edges, one superior or anterior, the other inferior or posterior. These two little edges, oblique from before backward, unite and form, together, an irregular *pas-de-vis* (turn of a screw,) a line in length, and terminated by a very sharp point designed

After having stated the inconveniences of this mode of treatment, it is our impartial duty not to conceal its advantages.

M. Savary thinks that the perforation of the membrana tympani, for deafness, is only useful when that membrane is incapable of performing its functions, or when it impedes the passage of sound. "It is very true," says he, "that a species of deafness has been cured by perforating the membrana tympani, but in this case we cannot reasonably suppose that this membrane, indurated or changed in some degree, could either be capable of fulfilling the functions for which it is designed, or do otherwise than hinder the passage of sounds.*"

for making a puncture in the tympanum. This first opening facilitates the entrance into the tympanum of the two little edges, which, being then drawn outward, cut the portion of the tympanum placed between them and the oblique extremity of the canula of which mention has been made. The two pieces are so adjusted that the edges of the mandrin glide upon the side of the canula along its whole length, in order that, issuing from the extremity of the latter, it may re-enter, acting with it precisely as do the two blades of scissors. The superior extremity of the canula is fastened to the body of the instrument where the mechanical part of it is, which I have said is very complicated. The instrument is contrived in such a manner, that when it is once accurately applied by its sharp, oblique face, to the septum, which may be cut without danger and conveniently fixed, the mandrin then descends by a rotary movement upon the membrane, a line and a third beyond the canula, and returns by describing the same movement; this produces a wound with a loss of substance, and the portion removed from the tympanum returns with the edges of the mandrin into the canula which receives them."

The operation being completed, nothing more is to be done than to prevent inflammation, which might be developed within the cavity of the tympanum. M. Deleau is very careful to place his patient in a situation where he will be but little disturbed by noise, to fill his ears with cotton, and to keep the head warm, by covering it with a handkerchief passed under the chin and tied on the top of the head. For a few days he also causes him to avoid

* Dict. des Sciences Médicales, t. 2, pp. 455 et 456.

The operation is to be preferred to all other means in the cases named by M. Savary, with which we have classed ossification of that membrane.

We will now examine those cases in which the operation has been successful, and which have been published in various journals. We will commence with those of Mr. Cooper.

Case 1st. "A woman thirty-six years of age consulted me in December last, in regard to one of her children. In questioning her, I perceived that she was deaf, to that degree that I had much difficulty in making her hear me. I questioned her in regard to her disease, and she informed me that her deafness became apparent after a very violent cold which she had had in the winter of 1793, and which had been accompanied with inflammation of the tonsils. I discovered that the

any considerable motion of the jaws in masticating, and deprives him of cold drinks. It is, perhaps, owing to neglect of these precautions, that this operation has hitherto met with so little success. To prevent every kind of accident, would it not be useful, for the purpose of preserving the ear in its state of integrity, to adapt an artificial membrane to the bottom of the concha, which, in a very imperfect manner indeed, may supply the place of the membrana tympani, but which, by enclosing a cavity beyond that of the tympanum, may prevent the too intense impression of the air upon organs not accustomed to receive such an impression?

The great advantage of the instrument of M. Deleau consists in its making a wound with loss of substance, so that its closure is impossible. But this operation has the inconvenience of being made without the surgeon being able to direct it. He ought, it appears to me, to employ, very cautiously, an instrument which, once put in motion, proceeds to complete its revolution in a mechanical manner, and without being at all directed by the judgment of the operator; this apprehension is increased when we recollect that the force is directed into an organ so complicated as that of hearing, and upon a membrane so delicate as that of the tympanum.

It is expedient in surgical operations to employ, as rarely as possible, instruments which are altogether mechanical. The knife, which is to divide the living tissues, and pierce the interior of our organs, should be confided to the hand employed by the skilful surgeon. Th. P.

disease proceeded from obliteration of the eustachian tube, and I proposed the operation to her. As she earnestly desired to recover her hearing, she submitted without hesitation. I performed upon her, at once, the puncture of the membrana tympani, in both ears, beginning with the left ear which was most diseased. As soon as the membrane was perforated, to the satisfaction of us both, she could hear perfectly every thing which I said in an ordinary tone of voice. She remained with me half an hour, and on leaving me, her hearing was perfectly restored."

It is obvious that, in consequence of a catarrhal engorgement of the throat and nasal fossæ, the pituitary membrane which lines those and the interior of the eustachian tube, may be swelled—it may happen that mucous accumulates in the latter, and that it even concretes there—swollen tonsils may compress the tubes and mechanically produce deafness. All these causes whether they act separately or conjointly, will give rise to difficulty of hearing, and even to deafness; but we cannot see how a catarrh and inflammation of the tonsils could occasion obliteration of the eustachian tube.

Mr. Cooper says, "I discovered that the disease proceeded from obliteration of the eustachian tube." But obliteration of these cavities produces deafness more complete and absolute, as I shall prove in the course of this work. Now, according to Mr. Cooper himself, this woman still heard, therefore there was no obliteration. From this consideration, I deem it necessary to remark, that Mr. C. has given no reason to substantiate his assertion.

In the case under consideration, I am persuaded that hearing would have been restored with more certainty in regard to its continuance, the organ remaining untouched, by clearing away the obstructions of the eustachian tube, through the means of injections thrown into these canals by the way of

the nasal passages, or by removing the pressure which the swelling of the tonsils might exercise upon the sides of the tubes, by producing resolution of those glandular bodies, by means which will be pointed out hereafter.

Case 2d. "Anne Daley was admitted into Guy's Hospital, January 21, 1801. She was so deaf that she did not hear the strongest voice, although the mouth was applied to her ear. The disease was the sequel of certain ulcers of the throat.

On the 25th of January, I performed the operation on the left ear, and it was scarcely finished when she could hear, at the distance of many feet, the beating of a watch, which, before the operation, it was necessary to place between the teeth, in order for her to hear the beats. The next day I operated on the other side, in presence of Mr. Itocker, the apothecary of the Hospital, and many other professional gentlemen, who were acquainted with the cause of the deafness. The ear already operated on having been purposely filled, the experiment with the watch was repeated with the same success as the day before. In this woman, says Mr. Cooper, "the sense of hearing was completely restored, and has suffered no alteration."

This, it must be admitted, is an operation which, at once, does honour to surgery and to the operator. In the case in question, no one can doubt the closure of the eustachian tube, since complete deafness followed the existence of ulcers in the throat. The case belongs to the few in which it is proper to try perforation of the membrana tympani; nevertheless, I do not think that, hereafter, we ought, in the first instance, to perform the operation. We may, and we ought previously to endeavour to restore the organ of hearing to its primitive state, by opening the eustachian tubes, through the means of a process which I will describe in the first chapter of the third section.

Case 3d. "I have had occasion to see, in the course of the last month, a man who had received a violent blow on the head. He suffered all the symptoms of concussion, and a considerable hemorrhage occurred from the two ears, together with complete deafness. The symptoms, produced by the concussion were dissipated in a short time, but the deafness continued. I carefully cleansed the auditory passage of the blood with which it was filled, but without success. Supposing then, that the tympanum might be filled with blood, which might obstruct the eustachian tube, I pierced the membrana tympani with a trochar. The point of the instrument was red when I withdrew it, and I saw, each day, a mixture of black blood and ceruminose matter, flow through the opening which I had made. The discharge continued six days, at the end of which the ear had perfectly recovered its functions."

The puncture of the membrana tympani, under these circumstances, succeeded only because the blood still preserved a little of its fluidity. If this fluid had become concrete, as ordinarily happens when it stagnates, the operation would have been fruitless; unless, indeed, injections had been conjointly used, as M. Itard employed them with so much success upon young Dietz, a deaf-mute.

In the case reported by Mr. Cooper, injections through the eustachian tube would have had, over the perforation of the membrane, the double advantage of more certainly relieving the organ of hearing, and of leaving it uninjured. This assertion will be substantiated by facts.

Case 4th. "Mr. Rooun of C.," says Mr. Cooper, "consulted Dr. Bailey on account of his son, aged 17 years, who had been affected with congenital deafness, which rendered him unable to hear any thing. Dr. Bailey being assured that the auditory nerve was not affected, sent him to me.

"I discovered that the disease proceeded from an unnatural formation of the fauces, and that, with him, the opening of the eustachian tubes did not exist.* The auditory nerves were sound, for he could hear the beating of a watch placed against the side of his head. He had never experienced any thing of vertigo or paralysis. I advised the operation, to which he willingly submitted. The moment the membrane was pierced, and air was permitted to penetrate the tympanum, he seemed animated with a new existence. The confusion of the infinite number of sounds, which all at once struck his ear, produced in him such a sensation that he fainted. This state continued about two minutes, after which he expressed a wish that the operation might be performed upon the other side. This was done with the same success, and without his experiencing, in the mean time, the same fainting as before. Two months after I learned, with much pleasure, that he had experienced no relapse nor any inconvenience in consequence of the operation."

Mr. Cooper appears to me to be very indefinite in his explanation of the causes of deafness; he particularizes none, at least, in the translation which is found in the Bibliotheque Germanique.

If, in the subject of the last case, deafness was caused by preternatural conformation of the fauces, and if, in him, the orifice of the eustachian tubes did not exist, then the perforation of the membrana tympani was the only means to be tried.

M. Michaélis wrote to M. Hunold that he had restored hearing to a lady by performing, without the least pain, the puncture of the membrana tympani, according to the method of Cooper. M. Hunold, after the assertion of M. Michaélis, resolved to try the same operation.

* It is to be desired that Mr. Cooper had said how he was assured of the fact.

Case 1st. "A woman, forty-five years of age, had been deaf for ten years, in consequence of a violent inflammation of the ears caused by a severe cold. She heard none with the right ear, and scarcely any with the left. M. Hunold pierced the membrane on the inferior and internal part, (without doubt of the right ear.) The patient instantly heard all that was said to her, and declared that she experieneed no pain, but only a cracking noise which was produced by the puncture."

In this case, it appears that the right eustachian tube was closed by a cicatrix, the result of inflammation and ulceration. The perforation of the membrane of the tympanum, being found to be then the most advantageous means of restoring the hearing, we ought to employ it.

This operation was by no means necessary on the left side, since the tube was not stopped, or but imperfectly so. Injections, such as we propose, might have been employed with success, the deafness of that side, without doubt, proceeding from some obstruction in the eustachian tube.

Case 2d. "A man perfectly deaf with the right ear, and who heard but little with the left ear, had had good hearing till the age of twenty years. While bathing on a day in summer, he began to toy with his companions, and ended by fighting. In the midst of this strife, and while very warm, he plunged head-first into the river, from a high bank which bordered it. He was immediately taken out without signs of life. With much difficulty he was restored, but he remained deaf, notwithstanding the employment of many remedies which are proper for deafness produced by the sudden chill which he had experienced in falling into the water. The perforation of the membrane has restored his hearing."

M. Hunold ascribes this deafness to the sudden chill which the patient had experienced in falling into the water. But deafness, under these circumstances, is only the secondary

effect of cold, admitting that this be the original cause of deafness. What then should be the primary effect of the chill which the young man suffered, and which, according to M. Hunold, was followed by deafness? This could be nothing but paralysis of the acoustic nerves. Now the perforation of the membrana tympani cannot restore hearing, when the defect of this sense is owing to palsy of the auditory nerves. I am very far from thinking that M. Hunold practises any deception, in regard to the real results of the operation which he performed in this case; but I believe that he mistakes in regard to the cause of deafness. The young man had been plunged head-first into the river; he was taken out, at the same instant, without signs of life; he was restored with much difficulty. Who has not witnessed the effect of a violent disturbance of the cerebral mass, caused by a fall on the head, against some resisting body, and the deafness which followed it, the consequence of an effusion of blood or lymph, which takes place in the cavity of the drum and eustachian tube?*

Case 3d. "A woman sixty-three years of age, deaf during thirty, in consequence of blows which she received from her husband, at least according to her declaration, heard with neither ear, which circumstance urged an operation on both immediately. This woman perfectly recovered the hearing of the left ear, and that of the right imperfectly, repeating, word-for-word, every question that was proposed to her."

"The author," says the Journalist, "performed about a hundred other operations, of which two thirds were successful."†

When a man thus exaggerates his success, he loses the right of being believed on his word, and destroys the confidence and

* The author does not say that any fluid escaped from the artificial opening.

† Journal de med. chirurg. pharm. fev. 1793.

inclination of those, who might be disposed to examine further the facts which he alleges.

M. Celliez, M. D. performed this operation on a woman fifty-nine years of age, deaf during twenty-two years, in consequence of an acute disease. The patient, according to the remark of the author of the case, had been always subject to catarrhal discharges, particularly to discharges of this kind from the head.

"A careful examination of the ears having convinced me," says M. Celliez, "that the deafness depended on a stoppage of the eustachian tube, I thought that this was a proper case in which to practise the operation which Mr. Cooper advises. The fourteenth of November, the patient being conveniently placed, I took a trochar slightly bent, about fifteen millimétres in diameter, and the point of which passed beyond the canula about thirty millimétres. With it I perforated the membrane of the tympanum quite near its inferior and anterior edge. I had scarcely withdrawn it when the patient cried out, I hear. She remained some time, as it were, stupified and immoveable. Having asked her in an ordinary tone, if I had donc her any harm, she answered no, and begged of me to speak lower.

"After some moments of repose I perforated the other tympanum. She could, immediately afterwards, hear every word that was spoken to her, but the noise troubled her a little, and it was with difficulty that she could bestow the attention necessary to comprehend a discourse, or long sentence.

"I performed the operation at the place directed by Mr. Cooper, to avoid touching the handle of the malleus; but more especially," says M. Celliez, "in order that the atmospheric air may acquire, by passing through the external auditory meatus, a temperature more uniform with that of the ear; for, continues the author, if the atmospheric air be introduced di-

rectly into the labyrinth,* it will be soon rarified, by the heat of the organ, and afterwards be displaced by a fresh column of denser air; a circumstance that will establish a kind of current, which will necessarily cause much pain. Finally, this place, it appears to me, ought to be selected for the puncture in order to avoid injuring the vessels and nerves of the tympanum; for although I am aware, that this injury is not usually attended by serious accidents, I think that a hemorrhage, however trifling we may suppose it, may furnish a clot sufficient for the obstruction of the opening made in the tympanum; and may not the imperfect laceration of a nervous filament occasion pain which it were more prudent to avoid?"†

If M. Celliez had no other data by which to discover the obstruction of the eustachian tubes, than the examination of the external ear, strict as he supposes that examination to have been, he committed all to conjecture.

The patient of M. Celliez became deaf in consequence of an acute disease; what that disease was, he does not say, but the author adds, that the patient was always subject to catarrhal discharges from the head. This habitual indisposition was undoubtedly the principal cause of the stoppage or obstruction of the eustachian tubes in this woman.

M. Celliez, to prevent the opening made in the membrane of the tympanum from closing, as often happens, thought proper to use a trochar of a diameter much larger than that of Mr. Cooper's. I stated the accidents which might arise

* The Author is mistaken; the air, in a state of health, does not penetrate into the labyrinth; the foramen rotundum and ovale are closed hermetically, and yield no access to this fluid; the labyrinth is filled with the lymph of cotunnus. M. Celliez means, without doubt, the cavity of the tympanum and the mastoid cells.

† Journal de Medicine, Brumaire an. xiii.

from the use of this trochar. I will finish this paragraph with the following corrallaries.

1st. The perforation of the membranc of the tympanum is the only operation that is proper in a case in which this partition is cartilaginous or ossified, and in which the rest of the organ is healthy.

2d. It will be employed with success, in stoppage of the eustachian tube, when it is impossible to remove this obstacle by the means which shall be pointed out and described hercafter; also when it is owing to mal-conformation, chronic swelling, or polypus in the nostrils.

3d. This operation is insufficient, when the cavity of the drum is obstructed by matter which is so thick that it cannot pass through the artificial opening.

4th. It will be useless when deafness depends on paralysis of the auditory nerves.

5th. It will be equally so in case of deafness which proceeds from catarrhal affections and nervous irritation.

6th. When deafness is the consequence of adynamic and ataxic fevers, and the eustachian tubc unobstructed, this operation will be ineffectual.

7th. Finally, this operation, excepting in the two first cases, ought to be rejected in the treatment of deafness.

CHAPTER VII.

On rupture of the membrane of the tympanum.

This membrane may be merely ruptured, partly wanting, or completely absent. Several causes may produce a rupture of this partition, such as an ear-pick thrust in too far,* a violent inspiration,† sneezing,‡ an erosion caused by pus;§ this last cause is the most frequent.

Rupture of the membrane of the tympanum, from whatever cause it proceeds, is easily ascertained: 1st, by the air which proceeds from the external auditory meatus with a whizzing sound, forming a current of air strong enough to move the hair or the flame of a wax candle, placed opposite and near the concha of the ear; 2d, if we pass an injection through the external auditory meatus, the liquid falls into the fauces, or passes through the nose; 3d, by injecting the eustachain tube, the liquid passes through the external auditory meatus.

These are the means by which I ascertained it in several cases.

The simple rupture of the membrane of the tympanum heals without the interference of art; this is proved by the experience of Valsalva, of whom we spoke, page 53. M. Maunoir,‖ according to the observation quoted on the same page, saw the opening that had been made in this membrane almost cicatrized twelve days after the operation. A person named C. on whom I practised Cooper's method of operating, experienced the same inconvenience.

The partial destruction of the membrana tympani brings on

* Riolan. † Duverney, Traité de l'organe de l'ouïe, p. 178.

‡ Tulpius, obs. 35, Verdue, Traité de physiol. t. II, p. 102

§ Fabrice de Hilden, Sckinkius.

‖ Journal de Corvisart, Brumaire, ar. xiii

difficulty of hearing, but not the total loss of that sense. I could quote, in support of this assertion, several instances derived from my own practice.

It is not so, however, when this membrane is entirely wanting, because being intimately connected (in its healthy state) with one of the principal little bones of the ear, the articulation of this bone suffers considerably from want of support. This derangement of the malleus cannot take place without the other little bones, which are articulated with it, experiencing a relative change which will severely affect the faculty of hearing. We notice the opinion of a modern author on this subject. "Nevertheless," says M. Leschevin, "whatever be the cause of the rupture of the tympanum, it is incurable; and it always induces deafness, if not at once, yet by degrees; however, if this membrane be of no use, as some physicians have pretended, and among others Schelsammer, but to guard the internal ear from the injury of the cold air and exterior bodies, we might attempt to substitute an artificial membrane, but its connexion with the little bones and the other parts of the ear, convinces us that it is by no means useless in regard to the perception of sounds, and that the influence of the air would be ineffectual without it."*

Art is ineffectual as well when the membrane is merely torn, as when it has suffered loss of substance. In the first case nature accomplishes the cure, and in the second the malady is incurable.

I shall not recommend for the purpose of protecting the internal ear against cold air, and particles of foreign matter floating in the atmosphere, the insertion of a false membrane, as is suggested by Leschevin; a little wad of cotton lightly rolled and placed in the orifice of the external auditory foramen will be sufficient to remedy that inconvenience.

* Prix de l'Acad. royale de chirurg. t. iv. in fo.

SECTION II.

On the diseases which affect the cavity of the tympanum, the martoid cells, the little bones of the ear and their muscles.

Catarrh; acute inflammation; suppuration; purulent infiltration; caries; extravasation of blood; the accumulation of mucus, of ceruminose matter, and chalky substances, are affections which may assail the parts above mentioned.

CHAPTER I.

On Catarrh of the internal ear.

This disease is an inflammation of the mucous membrane which lines the cavity of the tympanum. Sometimes it is merely a transient evil, and sometimes productive of serious mischief. Age, sex, temperament, errors in regimen, may, says M. Alard,* modify the disease and greatly influence its duration; hence the distinction between acute and chronic catarrhs.

The first, almost always belonging to infancy and youth, is, nevertheless, sometimes a disease of adults. The second, more common to all ages, more especially affects the aged. Atony of the lining membrane of the internal ear, proceeding from decay of the powers of life, gives origin in them to this infirmity.

The causes which give rise to catarrh of the internal ear

* Essai sur le catarrhe de Coreille Paris, 1803.

are sudden variations of atmospheric temperature, as a sudden transition from warm to cold, from dry to moist; the suppression of some accustomed evacuation, such as that of an ulcer or hemorrhoidal discharge; the repulsion of a scabietic humour or that of whooping cough.* In infancy the irritation of dentition is often the cause of this disease, because that irritation determines an increased action in the head, which disposes all the organs which it contains to frequent morbid changes. Very many infants, deaf-mutes (in consequence of a catarrh of the cavity of the tympanum, or of the eustachian tube, or of some cutaneous eruption repelled upon the organ of hearing) for want of well directed attention are doomed to remain thus diseased during life because heretofore their infirmity has been regarded as a fault of original conformation and, as such, incurable.

The acute catarrh is characterized by extreme pain; nevertheless M. Alard† thinks that when inflammation is confined to the cavity of the tympanum it gives but little pain, scarcely felt, "in the character of a slight tingling and an inconsiderable feeling of tension that the patient bears without inconvenience."

I am not aware whether M. Alard speaks from his own experience, but I can assert that I saw the contrary in several persons affected with catarrhal inflammation of the mucous membrane of the cavity of the tympanum; the pain was most severe, even to the termination of the disease. In relation to this subject I will relate two facts derived from my own practice, not in order to invalidate the opinion of M. Alard, whose distinguished talents I respect, but to present a complete view of symptoms which characterise the species of affection which I describe.

* Ouvrage cité. † Ouvrage cité.

D. a youth sixteen years of age, early in June, 1810, proceeded early in the morning to drain some boats which were on the river Saone; he went into the water, with his feet bare; the morning was cold, and the work occupied him several hours. On leaving the water, he felt some chillness, and soon after the boy was affected with the following symptoms; pain and heaviness of the head, heat and painful tension of both ears, with a very troublesome tingling, difficulty of hearing, a darting sensation at first obscure. Soon these symptoms became aggravated in a violent degree; the fever became intense; the pains of the ear excessive; the least motion produced a ringing sensation in the parts affected, so that the young man suffered very much when he coughed, sneezed, or opened his mouth. On the third and fourth days, he had, from his nose and mouth, a considerable discharge of mucus and puriform matter; this evacuation afforded him a remarkable alleviation.

A spare diet, diluent drinks taken copiously, leeches applied to the side of the neck and near the ears, anodyne cataplasms placed on those parts, were the means which I employed to combat those affections, which yielded after a few days.

M. A. a book-keeper of this city, aged fifty-nine years, was seized with difficulty of hearing, accompanied with a considerable degree of buzzing noise. He consulted me, the last of October, 1812. The atmosphere at the time was cold.* I threw injections of warm water containing ether into both ears, through the eustachian tubes. After employing these injections for some days, M. A. felt a painful tension in the interior of the left ear, a pain which increased considerably,

* Cold and damp weather is unfavourable to the treatment of the organ of hearing by injections introduced into the interior of it. I have remarked this circumstance in several cases.

and extended to every part of the head: in a word, he had every affection of which I spoke in the preceding case. The particular circumstance attending the present case was a copious serous discharge from the external auditory meatus. This discharge supervened from the third to the fourth day of the attack, so that the patient was affected at the same time with an external and internal catarrh; in fact he heard nothing with this ear.

All these symptoms yielded to the means which we have mentioned in the preceding case.

After the symptoms disappeared, the patient, by degrees, recovered the faculty of hearing as he enjoyed it before the employment of the injections, and the buzzing noise remained the same; a circumstance which seems to prove that this latter affection, as well as the deafness, was owing to injury of the auditory nerve.

When a catarrhal inflammation attacks at once the cavity of the tympanum, the mastoid cells, and the eustachian tube, the symptoms are more severe: first, painful tension in the ear and fauces, spasms of the muscles of the head on the affected side, pain in turning the head, extreme dryness of the nose and mouth, darting sensations which extend from the tympanum to the pharynx, false or irritable hearing, a sympathetic pain in every part of the head, violent pain in the whole ear; finally, fever, restlessness, delirium, sometimes phrensy, an epileptic attack and death.* Two cases borrowed from M. Alard's excellent dissertation will confirm, in a great measure, the statement that we have made.

"A girl after her tenth year, was in the habit of working lightly clothed, during summer, near a glass door which opened into a garden.

* Duverney, traité de l'organe de l'ouïre. Sauvages, nosologie, t. II.

"She felt in the interior of her left ear (that which was towards the garden) a painful tension, which created a disagreeable feeling of restlessness, without amounting to pain strictly so called. The organ seemed to be insensible.

"On the second day, this indistinct feeling of tension and numbness, changed into acute darting pains, which the patient compared to those which are felt during the formation of an abscess.

"The third day, there was a little amendment.

"On the fourth, the lancinating pains had subsided a good deal, but the ear returned to the same state in which it had been at the period of attack, and at that time the painful tension extended to the fauces.

"On the following day, there were head-ach, spasms of the muscles of the back of the head, acute pain along the eustachian tube, difficulty in performing the rotary motions of the neck; finally, a feeling of erosion in the left side of the pharynx during deglutition. The perception of sounds had been confused for some days."

The subject of the second case was a girl nine year sof age, who, in consequence of the sudden suppression of whooping cough, contracted a catarrh of the left ear.

"The first day the little patient complained only of a sore throat and difficulty of swallowing. She, every instant, raised her hand to the ear, in which she experienced a troublesome itching. Her hearing was a little altered.

"On the next day the symptoms had become more intense. The internal parts of the ear, and the whole left side of the head, were so painful that the patient knew not to what place to refer the disease which she suffered. There supervened fever, vertigo, and some degree of delirium, which continued till the night of the fourth day, when the disease was assuaged by the

sudden expulsion of fetid matter which issued from the meatus auditorius."

Chronic internal catarrh,* according to M. Alard, occurs with or without discharge. In the first case it is always the sequel of acute catarrh, and the matter which is discharged by the external meatus, escapes from the interior of the ear, through a fistulous opening of the membrana tympani. This opening, together with the catarrh, produces a difficulty of hearing more or less considerable, but it is rarely followed by complete deafness. In the second case, it occurs sometimes in consequence of acute catarrh, at other times spontaneously, and it causes a great degree of deafness, but not perfect.

"We meet with another kind of inflammation which," says M. Alard, "readily assumes the chronic character, and which is remarkable for the great quantity of mucus that it furnishes. This mucus, secreted in the tympanum, becomes so thick, that the whole of it cannot escape through the tube, and, finally, obstructs it completely. It causes a difficulty of hearing, which we frequently meet with, in a greater or less degree, according to the direction of the wind, or the state of the atmosphere."

"We meet with this disease sometimes in children," adds the author, "but it ordinarily afflicts persons between forty and fifty years of age. It is the cause, as we have just stated, of the majority of cases of deafness, so common in society, and which are regarded as incurable. They are, however, very different from those which arise from injury of the auditory nerves—they leave these nerves in a sound state, and only present a mechanical obstacle to the perception of sounds."†

It is true, that a chronic catarrh of the cavity of the tympa-

* Essai sur le catarrhe de l'orielle. Paris, 1803.

† Ouvrage cité.

num and mastoid cells, very often causes a superabundant exeretion of mucus, which, accumulating, causes deafness in a greater or less degree; but I do not think, with M. Alard, that this affection confines its influence "to the presenting of a mechanical obstacle to the perception of sound, and that it always leaves the acoustic nerves in a sound condition." I believe, on the contrary, that the frequent repetition of catarrh of the internal ear, also obstinate chronic catarrh, leaves the auditory nerves in a state of insensibility approaching paralysis. The following facts yield support to my opinion.

C. a soldier, twenty-five years of age, discharged in consequence of being deaf, consulted me concerning his condition, in the month of September, 1813. His infirmity was the effect of much exposure in the field. It had been preceded by pain in the fauces and ear, and by obstinate defluxions, with a copious exeretion of mucus from the mouth and nose. All these symptoms disappeared; but he remained very deaf in both ears, particularly the left, with a very troublesome buzzing noise.

On the twenty-first of the same month I injected the right ear, through the eustachian tube; these injections were repeatedly made with warm water to which I added some drops, either of lavender water, sulphuric ether, or tincture of musk; afterwards I employed warm Balarue water.

After a few days' treatment, the buzzing had considerably diminished, and the patient heard a little better with this ear. At the end of a month this young man heard very distinctly, when he was addressed in an ordinary tone, and the buzzing had ceased.

It was impossible for me to inject the left ear: a polypous body situated in the back part of the nostril of the same side, presented an insuperable obstacle. Consequently, I determined to puncture the membrana tympani, according to Cooper's

method, and I injected the ear through the external auditory meatus, with similar liquids. These liquids passed into the fauces, a circumstance which proves that the polypous did not perfectly stop the eustachian tube. After the tenth or twelfth day, the artificial opening was entirely closed. I performed the operation again with the modifications described in chap. vi. sec. 1. With the assistance of these means the artificial opening was preserved; the patient hears a little with this ear, but the buzzing remains the same.

M. P. forty years of age, book-keeper of this town, was affected with difficulty of hearing, with a buzzing, in the left ear, and in the right with deafness and a similar buzzing. This indisposition was the effect of catarrhal discharges from the throat, the nasal fossæ, and the internal ear contracted in the field during the siege of Lyons.

M. P. consulted me on the twenty-ninth of August, 1813. I advised him to submit his right ear only, to the treatment which I proposed. It was injected daily with the same liquid, and in the manner stated in the foregoing case. No injection was more effectual than the mineral water of Balaruc. After six weeks' employment of these injections, the buzzing had diminished considerably and the patient heard very well with that ear.

Before this treatment M. P. was affected with pain in the head and numbness, and the buzzing increased whenever he was engaged in calculation, which required some mental effort; now he can exercise his mind without the least inconvenience.

A circumstance worthy of notice, is, that the deafness of the left ear, which progressed rapidly, had been arrested in its progress by the treatment of the right ear alone; a fact, which proves in an incontestible manner, the direct sympathy that exists between these organs.

From these two facts, we draw the following conclusions:

1st. Chronic catarrh of the internal ear leaves behind it a difficulty of hearing more or less considerable, which, instead of diminishing, increases in course of time.

2d. The deafness, which proceeds from chronic catarrh, does not always depend on mucous matter accumulated in the cavity of the tympanum, in the mastoid cells and the eustachian tube. This is proved by the facility with which the injections passed into those cavities in the subjects of the two cases which I have just related.

3d. Catarrh of the cavity of the tympanum affects the nerves and the organs of hearing more or less; but this affection, though chronic, may be successfully treated by injections into the interior of the ear.

Treatment of acute catarrh.—On the first appearance of the disease, we must oppose it by general remedies. Attention to diet, diluent drinks, bathing, pediluvium, blisters applied to the nape of the neck or between the shoulders, are the means which we ought to employ. The patient must avoid cold and damp air; the part affected ought to be kept in a state of moderate warmth.

But if it should happen that a catarrhal humour accumulates in the cavity of the tympanum, we should employ a prompt and efficacious remedy. "The most urgent indication, in this case," says M. Alard, "is, to make a passage for the retained humour to escape."

I am of his opinion, but we differ with respect to the means to be adopted in such a case. M. Alard advises the puncture of the membrana tympani. I am far from condemning this mode, but I would wish, before we had recourse to this operation, to endeavour to discharge the humour contained in the cavity of the tympanum, by injections of warm water, passed through the eustachian tube.

This practice would have a double advantage, the removal of any obstruction of the eustachian tube and the rendering of the humour contained in the tympanum more liquid, and consequently facilitating its escape through the same tube.

When the humour has escaped from the cavity of the tympanum, either spontaneously, or by means of a passage made for it, the symptoms disappear, and nature is adequate to perfecting the cure.

But if any circumstance causes the catarrh to assume the chronic character, or it spontaneously does so, we ought to adopt the following course.

Injections slightly tonic, such as a weak decoction of cinchona, infusion of mint water, to which are added a few drops of lavender water, cologne-water or sulphuric ether should be used. The mineral water of Balaruc, and that of Barege are equally proper in this case.

M. Double* recommends a strong decoction of juniper berries. He says that he employed them with success.

Whilst we apply these remedies to the parts affected, we ought, from time to time, to stimulate the mucous system, by purgatives repeated according to circumstances; also the skin by sinapisms, blisters, the cautery, and setons. Hoffman cured a woman upwards of sixty years of age, by external topical applications, and mild purgatives occasionally.

He relates the history of a man, who, from the age of sixteen, was deaf in the right ear, and who, beginning to fear for the left, consulted him. I prescribed for him, says Hoffman, a drastic purgative, which was to be taken in divided doses in the course of the week. The patient swallowed the whole at one time. This imprudence occasioned a severe cholic with alarming symptoms. During their continuance the

* Journal de Med. Chirurg. Pharm. t. xxxi. pp. 40 et 41.

patient suffered excruciating pain in the right side of the head, principally around the ear; afterwards there was a considerable noise in that organ, and the hearing was perfectly re-established.

This fact proves incontestibly that it is possible to cure deafness of any contumance or degree, when it is the consequence of chronic catarrh of the internal ear, by exciting an irritation on the mucus surface, remote from the seat of the malady, as the two cases that I have related at page 73 and the following, shew, also proving the good effects of baths introduced into the interior of the ear in the form of injection.

Is it proper to attempt the cure of chronic catarrh? Two circumstances allow the interference of the physician, first, when the disease affects a young person,—however, we must attack the malady with caution, either establishing a blister or an issue, and permitting it to flow some time after the cure. The patient should be purged occasionally with the ordinary purgatives or the mineral waters.

The second case in which we are permitted to attempt the cure of chronic catarrh, is when the disease is the consequence of some suppressed periodical or habitual evacuation.

Frederick Hoffman effected cures by scarifying hæmorhoids and applying leeches to them.

M. Alard* quotes the case of a young girl, the discharge from whose ear had been stopped by restoring the secretion of urine.

A woman's ears had been discharging for six months in consequence of suppression of the menses. When they reappeared, the purulent discharge from the ears ceased spontaneously.

Except in the two cases, which we have just noticed, it

* Essai sur le catarrhe de l'oreille. Paris, 1803.

would be imprudent to attempt the cure of chronic catarrh; the health and even the life of the patient might then be compromised.

The ancients, and after them Duverney, have remarked that similar cases were always followed by convulsions, epilepsy or death.

Stalpart cites the case of a Venetian who had an old discharge from his ear stopped. Death was the immediate effect.

Duverney states "that a man sixty years of age, of a full and sanguine temperament, had a very considerable discharge from his ears, particularly the right, during twenty-five years, although, in other respects he enjoyed good health. The matter discharged was fetid and very thick. This discharge being stopped, he died of apoplexy in twenty-four hours."

M. Alard says "that an attorney in Paris* had an ear discharging matter copiously for a long time; the humour being repelled by cold, the ear became the seat of a violent inflammation, which induced very dangerous symptoms that were followed by death.

"Similar events," the author adds, "should instruct us how attentive we ought to be in the cure of those diseases while recent, and how important it is to oppose the tendency they have to become chronic."

* Duverney, Traité de l'organe de l'ouïe, p. 121.

CHAPTER II.

On acute inflammation of the membrane which lines the cavity of the tympanum and the mastoid cells; and on abscess and purulent infiltration into the same cavities.

The cause which produces catarrh of the internal ear, may in like manner induce acute inflammation, commonly termed otitis. When eruptive diseases, such as the small-pox, the measles, and especially scarlet fever, are opposed in their course, the morbid humour may be translated by metastasis, to the internal ear and produce serious consequences, as is ascertained by the following facts.

M. D. of A. twenty-eight years of age, had been seized, at the age of fourteen, with scarlet fever; his mother who lived in some part of Lyons, came to bestow on him all the attention of which maternal tenderness is capable. Her first care was to remove him from his boarding school to another dwelling. This removal caused a repulsion of the exanthematous humour which was translated to the throat and eustachian tubes; the consequence was inflammatory quincy, violent otitis and otalgia, or ear-ach, copious suppuration in every part of the internal ear, obliteration of the eustachian tubes, and total abolition of the sense of hearing.

M. Ch*** of Marseilles, forty-years of age, had, at the age of nine, scarlatina anginosa, accompanied, as is generally the case, with inflammation of the fauces, which on the left side terminated in suppuration, the result of which was closure of the internal orifice of the eustachian tube, and complete deafness of the left year. In the interior of the same ear, the patient experienced only slight pain and no suppuration, a fact which lead to the presumption that the organ was susceptible of having its functions restored.

Symptoms.—Most of the symptoms of catarrh of the internal ear belong also to otitis, which is accompanied, among other symptoms, with fever, sleeplessness, often delirium, convulsions, and sometimes death, which, when the otalgia is extreme, occurs in a few hours.

The rapid progress of the syptoms, their intensity, the keen and burning sensation which the patient experiences in the affected part, the cessation of mucous secretion in the cavity of the tympanum, the mastoid cells and the eustachian tube, and the dryness of the meatus auditorius externus, are signs which distinguish this form of inflammation from the catarrhal.

When inflammation is about to terminate in resolution, the symptoms are less intense than when it terminates by suppuration or gangrene; they are gradually dissipated and when they have ceased, the organ of hearing perfectly recovers the integrity of its functions.

Pulsatory pain, fever with chills, indicate that the inflammation is about to terminate in suppuration. If to those symptoms there are added protrusion of the membrana tympani toward the external auditory foramen, and dull pains in the mastoid region, with œdema, these symptoms declare the existence of a collection of pus in the cavity of the tympanum and in the mastoid cells. But the discharge of the matter through the external meatus, or through the eustachian tube removes all doubt in regard to it.

When inflammation of the internal ear is about to terminate in gangrene, the symptoms become aggravated with inconceivable rapidity: a perfect alleviation succeeds them in an instant; but the face is soon covered with the paleness of death; fainting and hiccup alternate without interruption, and syncope terminates the life of the patient.

Treatment.—As soon as the disease appears, we must act promptly and energetically; a short time will bring about the

cure or death of the patient. The physician ought never to lose sight of the exciting cause of otitis. To restore the habitual discharges, the eruption which may have been suddenly suppressed, to re-establish the natural course of small-pox, measles, or scarlatina, are the first indications that demand our attention.

At the same time, we should oppose the inflammation directly, by bleeding from the arm, repeating it according to circumstances; by leeches applied to the side of the neck, near the affected ear, or on both sides, if both ears be affected. A large blister should be applied between the shoulders. A spare diet, diluent drinks, emollient injections, sinapisms to the feet, emollient and anodyne cataplasms to the ear, baths of the vapour of milk and some emollient decoction, are direct means which are proper to be employed. We should be cautious in the use of the preparations of opium, whether given internally or externally applied.

If the inflammation yields to the means which we have pointed out, we should conclude the treatment with mild purgatives, to prevent the chronic engorgement which often succeeds inflammation of the mucous membranes.

If, notwithstanding this treatment, the pulsatory pain continues and becomes more intense, we presume that the inflammation will terminate in suppuration. We are then to continue the vapour bath, to apply the cataplasms before prescribed, or those made of sorrel leaves with lard, or lily root with fresh butter, but it is obvious how little influence these means can have on a disease so deeply seated.

When we reflect on the structure of the soft parts which line the cavity of the tympanum and the mastoid cells, we can hardly conceive how any considerable abscess can form in merely a part of these cavities; it is more probable that several small ones exist at the same time, which, opening, furnish pus

in quantity sufficient to fill these cavities, painfully distend the membrana tympani, cause it to protrude on the the side of the external auditory meatus, rupture it and establish an opening through this membrane. Then a perfect calm succeeds the violence of the disease.

In this case there are two remedies which may be employed to abridge the sufferings of the patient, and arrest the painful efforts of nature—the puncture of the membrana tympani, and injections through the eustachian tube.

This last remedy, I again assert, whenever it is practicable, will have: 1st, the advantage of preserving the integrity of the organ of hearing; 2d, of affording a passage to the pus, and at the same time cleansing the cavity of the tympanum and mastoid cells, and thus accelerating the cure; 3d, of preventing the closure of the canal of the tube, nay, even its obliteration, which often happens as the effect of ulceration of that part in consequence of measles or scarlatina.

The following are facts which strictly, and in every particular, confirm the proposition (3d.) found in the preceding paragraph.

Berthon D. aged eighteen years, was affected at the age of three years with an adynamic fever, the deleterious humour of which threw itself upon the throat and the ears. The patient became perfectly deaf, and consequently dumb, and in the right ear there took place an habitual discharge of pus which made its way through the external auditory meatus. The deafness was such, as the parents informed me, that the young person could scarcely hear, even in an indistinct manner, the most violent peals of thunder, or the firing of large pieces of artillery.

I subjected this patient to the following treatment. The 9th of May, 1813, I, for the first time, threw a warm injec-

tion of the water of Balaruc into the internal ear, by the way of the eustachian tube.

The injection which I threw into the right ear, escaped freely from the external meatus, and brought with it a considerable quantity of pus. This circumstance, I confess, gave me a very unfavourable opinion of the condition of the organ. The next day I was informed, that, in the course of the night, the patient had discharged a still greater quantity of pus from the same ear, and that she had signified that she heard with that ear. Indeed it was apparent that she heard, because she gave attention when the hall-bell was pulled. I rang a bell near the right ear, and she made signs that she heard it. The same experiment was made upon the left ear, which had been injected, but the patient experienced no sensation.

I injected the right ear again, but by the external meatus. The liquid passed almost entirely by the fauces.

I injected both ears regularly every morning, through the eustachian tube. I also often injected by the external auditory meatus.

After eight days of this treatment, the slight pain, which the patient had from time to time experienced, since the beginning of her deafness, ceased, and with it the discharge of pus from the right ear; moreover, the patient heard, very distinctly, with that ear, the bell of a repeating watch.

It was not till the fifteenth day of the treatment, that Berthon D*** began to hear, with the left ear, the bell of the repeating watch. Since that time the organ of hearing has acquired new sensibility and force. The young lady is attentive to the least noise which is made near her.

On the twenty-fifth day, the patient heard the human voice, when she was spoken to in a tone a little above that of ordinary conversation. She even repeated some words, pronouncing them, however, very badly. For instance, in pronounc-

ing Robert, she said and still says—To...ber; Jean—Za...n; Pierre—ié...re; François—a...m...çois; Roux—a..a..rou; pére—pé...é...ré; mére—mé...é...ré, &c. She speaks in a high tone, and almost always when inspiring. There are many words that she will not repeat.*

At the end of a month from the commencement of the treatment, I discontinued the injections of the water of Balaruc, and substituted simple water, in which I dropped twenty or twenty-five drops of sulphuric ether to an ounce of water. These injections gave new energy to the organ of hearing; for, after using them for some days, the patient heard with more

* I have lost sight of this young lady and know not what progress she has has made in her pronunciation.

The above is perfectly analogous to what is observed in deaf-mutes, who hear articulate sounds well, but whose hearing is not sufficiently delicate to distinguish the shades of difference. Thus, ba, da, ga, are with them the same as la, fa, pa; they confound *poulet* with *foulet*—*daim* with *thyme*—*vœu* with *feu*. It is the same thing with all sounds, the delicate articulation of which requires an experienced ear.

But a phenomenon worthy of remark is that which I have often had occasion to notice, in the Deaf-and-Dumb Institution of Lyons. In the exercises which the professor causes his pupils to go through, in expressing the different passions, they, in the dumb-shew by which they represent objects of fear, sometimes utter a cry which expresses, with surprising precision, the idea which affects them, such as an exclamation of wonder—of fear—of terror—of pleasure or of pain, &c. The euphonic sounds, uttered by the human voice, under these different circumstances, are not, as M. Itard asserts, the result of imitation. Is it to be presumed that the class of half-deaf-and-dumb, to whom alone he appears to ascribe them, can distinguish, so well, sounds so transient, and utter them so correctly? I have heard, among others, the same cries uttered by those who were perfectly deaf, and in whom we cannot suppose them to have been the result of imitation. The explanation which M. Itard gives is very little satisfactory, and I believe it might with correctness be said, that this expression of the voice indicates a deep emotion, strongly felt—that it is the true language of the soul, and, as we may say, the cry of nature.

clearness and much better. The song of a canary-bird (the bird was in an apartment quite remote from my office) surprised her very much. She stood motionless and listened attentively. Her countenance, animated and expressive, indicated perfectly that she heard, with delight, these melodious sounds.

Finally, this young lady, after the fiftieth day, heard when one spoke to her in a low voice in the ear; she heard very well, at a little distance, the beating of a watch.

From the fiftieth to the sixtieth day, the organ of hearing remaining in the same state, I thought proper to discontinue the treatment.

Loud noise fatigues, and even distresses her; but this slight inconvenience, which is not of long duration, is common to all those who, having been for a long time deaf, recover their hearing in a short time, or at once; for if the sense is gradually restored, it is certain that one would not experience that painful sensation, which, nevertheless, is only transitory.

Berthon D. heard sooner with the right ear than with the left, although the deafness was equally complete in both. It is not difficult as I think, to ascertain the cause of this phenomenon. It was, as I believe, because in the left ear, the eustachian tube, the cavity of the drum, and perhaps the mastoid cells were obstructed by an earthy substance, hard, gray, and with difficulty detached from the cavities which it encrusted; while all the cavities of the right ear contained only matter which was not very hard, and hence easily permeable by the injections. Besides, the perforation of the membrana tympani, by facilitating the evacuation of the pus, and of the injected liquid, contributed much to the prompt removal of the obstructions and to the cure of the right ear.

It is a singularity worthy of remark, that the individual heard better with the right ear than with the left, although the

membrana tympani was in part deficient in the former. This tends to prove what many authors have asserted, that the integrity of that membrane is not indispensably necessary to the organ of hearing; provided, however, I would add, that the solution of continuity does not take place at the spot where the malleus is attached; for I think that if this bone were displaced, it would produce deafness, by the subsequent injury of the other bones of the ear; an injury which the lesion of the first would inevitably produce.

I here anticipate a question which may give occasion for censure, if I do not hasten to reply to it with arguments which I believe to be conclusive.

The membrane of the tympanum being open, I am asked of what utility it can be, to convey deeply into the nose, along parts of exquisite sensibility, an instrument for injecting the internal ear, whilst there is, in the external auditory passage, a more direct avenue, to enter which is less painful and less difficult?

However obvious may be the justness of this reasoning, I would observe that, in the right ear, the principal source of the suppuration was in the mastoid cells, which fact was made manifest by the dull pain in that region. My object was to drain the source of suppuration. Had I injected this ear only by the external meatus, could I have attained my object? I cannot think so; (a single anatomical examination confirms me in my opinion.) By injecting through the eustachian tube I throw the remedy as directly into the mastoid cells, as into the drum of the ear. As to the operation, it is neither difficult for the operator, nor painful to the person who suffers it.*

* What our author here says, in relation to the facility of introducing the instrument into the eustachian tube, and the little pain which is produced by injecting through that canal, does not harmonize with the statement

The following case goes to prove that which I have just stated, in regard to the insufficiency of injections through the external auditory meatus, in case of suppuration in the mastoid cells.

Miss B. seventeen years of age, was affected in her infancy with a strumous habit, of which she bears marks on the sides of the neck. The organ of hearing suffered most severely from it. Distressing pains, purulent collections in the cavity of the tympanum, rupture of the membranæ tympani of both ears, chronic suppuration, and very considerable difficulty of hearing, were the effects which this disease produced.

Upon this young lady there was bestowed all the care and attention which the tenderness and wealth of the parents could

of M. Itard, in his treatise on the diseases of the ear. "The introduction of the sound," says that author, "produces, in some persons, a tickling sensation in the interior of the nose, so intolerable, that it is necessary, by frequently repeating the attempt, to gradually familiarize the pituitary membrane to the contact of the instrument." Besides, he speaks of cephalalgia, vertigo, giddiness, and syncope, as being produced by these injections. This diversity of opinion, and such different results, proceed undoubtedly from the slight resemblance between the two instruments employed by these two operators. The shaft of M. Itard's instrument, is straight, and has only a slight curvature at the guttural extremity which terminates in a point. That of Saissy on the contrary is rounded at the same extremity, and has many curvatures which accurately correspond to the windings of the nasal channel. The instrument is so constructed that the operator with great facility enters the eustachian tube, without injuring the membrane which lines these cavities, when one has become accustomed to performing the operation, as I have recently satisfied myself, having had occasion to perform the experiment many times. The same advantages do not belong to the method of M. Itard. It is impossible that a straight sound can traverse all the windings of the nasal channel, and enter the gutural orifice of the ear, without lacerating, more or less, the pituitary membrane and the nervous filaments which are there present, and without endangering the delicate plates of the turbinated bones, circumstances which may produce the accidents of which M. Itard speaks. Th. P.

cause to be rendered by the most learned of the profession. Among the numerous remedies which were used, the mineral waters of Aix in Provence, and of Balaruc, taken upon the spot, administered internally and applied externally by bathing the ears, and introduced in the form of injections into the cavity of the tympanum, through the external auditory meatus, appeared to have removed the strumous habit. Without doubt, the age of puberty had much influence in producing this result. The young lady was, however, still affected with a suppuration in both ears, pains in the head which were felt in the mastoid regions, troublesome itching in the cavity of the tympanum and the mastoid cells; and, what was much more afflicting, the difficulty of hearing increased in spite of the injections of the water of Balaruc and a blister on the arm that she had worn from infancy.

The parents, despairing of seeing any termination of the disease, resolved to bring their daughter to this city. One of our most skilful physicians rendered her for some time the most judicious attentions, but, like every thing else which had been employed, they were unattended with success.

On being consulted in regard to the condition of this young lady, I judged, from the health which she appeared to enjoy, that the disease was local. M. M*** Jun. and myself determined that I should inject the ear by the eustachian tube.

On the 20th of Oct. 1813, I commenced the treatment with the water of Balaruc. Injections thrown into the right ear issued from the meatus externus, and with them, a considerable quantity of pus. The injections which I threw into the left eustachian tube, did not issue by the external ear, but escaped from the mouth and nose in a turbid state, which showed, as in the right ear, a collection of pus in the cavity of the tympanum and the mastoid cells.

After employing the injections for fourteen days, the pain in the head, the suppuration, and the difficulty of hearing had sensibly diminished; but the severity of the season rendered it necessary to discontinue the treatment.

These facts are sufficient to show at once the insufficiency of injections thrown into the interior of the ear, through the external auditory passage, and the efficacy of those which enter the same organ by way of the eustachian tube.

The celebrated Jean-Louis Petit,* speaks of an abscess in the internal ear, in regard to the existence of which the following phenomena are conclusive; 1st, its suddenly bursting through the external ear; 2d, the successive discharge of the small bones, and of fragments of the bony circle of the auditory passage and of the foramen ovale, caused by the use of injections for fifteen days. The patient lost the faculty of hearing in that ear.

Might we not obviate these accidents by seasonably introducing into the internal ear emollient anadyne injections, and, after these, those which are detergent? In this case, in employing the mode of injecting which we propose, the injection ought to be passed with particular care to avoid irritating the inflamed and painful parts.

Duverney has opened the ears of many infants after death in whom the tympanum was filled with pus. "It has occurred to me," says that author, "in studying the ear, to have often found the tympanum, the vertibule, the semicircular canals, and the cochlea entirely filled with thick matter, which may have been the consequence of an abscess of the membranes that line those parts. I am confident that this, as well as the collection of other humours which may take place in those cavities, often causes deafness."†

* Petit, Œuvres posthumes, t. 1.

† Duverney, traité de l'organe de l'ouïre, p. 151 et 152.

The following facts, in some measure, support the conjectures of Duverney.

Ther***, hair-dresser of this town, thirty-two years of age, had, during four years, slight pains in the ears with itching and suppuration. He often blew bloody pus from the nose, some degree of buzzing had preceded the pain and suppuration; dysécée, or difficulty of hearing, followed, and became so intense that the patient scarcely heard a person speaking in a very high tone. He did not perceive the beat of a watch but when placed on the concha of his ear.

On the eleventh of May, 1815, I commenced the treatment. Injections of Balaruc water, conveyed into the interior of the ear through the eustachian tube, at first caused a considerable quantity of pus to escape. The injections of the left tube escaped by the external auditory meatus, bringing with them the pus, which had been contained in the cavity of the tympanum.

The employment of these injections, during five or six days, enabled the patient to hear very well, when he was addressed in the ordinary tone, at the distance of from eight to ten paces, and the beats of a watch fifteen inches from the ear; but after the twentieth visit the buzzing and suppuration ceased, the cure appeared complete and the hearing re-established, at least as perfectly as the nature of the disease and the affection of the organ would permit.

Three mild purgatives were administered in the course of the treatment. This man had had, during several years, an issue in his left arm, which I advised him carefully to preserve.

This prompt restoration of the hearing was owing to the character of the proximate cause of the deafness, and to the treatment which was adopted. It does not require, it seems to me, much sagacity to perceive that thick matter (which fills the cavity of the typanum and glues together, if we may use the expression, the little bones of the ear, the membrane of the

tympanum, and that of the foramen ovale) is very well calculated to suspend, and even to destroy the faculty of the organ of hearing. It is easy to conceive also, that a process which washes the parts directly, is very sure promptly to disengage the thick and even solid matter which obstructs them.

The following case is perfectly similar to the preceding, except in regard to the cause:

The daughter of Madame, widow V. grocer of this town, fifteen years of age, had been subject in childhood to an eruption on the head; about the twelfth year this eruption disappeared, but near that period, the patient experienced pains and buzzing in the right ear, with itching and a discharge from the external auditory meatus, and sometimes when blowing the nose she discharged pus.

The difficulty of hearing was at first inconsiderable, but this infirmity progressed daily, so that on the 14th of September, 1815, (the day on which I began the treatment), this young person did not hear with this year except she was addressed in a loud voice and quite near. She did not hear the sound of the stroke of a watch but when it was applied to the concha of the ear.

The first injections, passing from the mouth and nose were turbid with the pus which they brought with them. If I pressed the piston of the syringe a little more than usual, some drops of the injection escaped by the external auditory meatus, which proves that ulceration of the membrana tympani existed; however, this solution of continuity must have been extremely small, since I could never discover it, and it became closed during the treatment, and the injections ceased to pass through the external auditory meatus, though they were injected with a degree of force.

The discharge from the cavity of the tympanum and from the external auditory meatus ceased about the thirty-fifth day;

however I continued them to the fiftieth. Two purgatives were administered at the conclusion of the treatment.

After the first injections the patient heard the beats of a watch at a foot's distance from the ear, and now hears them at more than the distance of two feet. If, after having stopped the left ear, she is spoken to in the ordinary tone at the distance of some paces, she hears very distinctly. She hears very well also if addressed in a low voice and near.

On abscess of the Mastoid Apophysis.

"Abscess of the mastoid apophysis," as is observed by Chopart and Desault, "forms a tumour more or less apparent, always slow in its progress, and accompanied with pulsatory pain and fever. It opens into the drum and the pus issues from the tube or ear, after having penetrated the membrana tympani. Sometimes the tumour extends behind the ear, with swelling, hardness, pain, and very little fluctuation. After the opening of the abscess, a fistulous ulcer is established which is often incurable, when the carious bone has not been discovered. At another time the pus, after forming a passage through the auditory meatus, issues from the ear without injuring the membrana tympani."* This last forms an external abscess of which we do not design to treat.

Abscess of the mastoid cells is often the consequence of the venereal disease. The celebrated Jean-Louis Petit quotes several instances. A scrophulous taint, the suppression of an habitual discharge, likewise a blow, a fall on the head, may cause it.

The symptoms which characterize this abscess are a gravitating pain in the interior of the mastoid apophysis, soft swelling, a slight inflammation in the skin which covers the part. If

* Chopart et Desault traité des malad. chir. t. I.

the pus has passed through the external osseous lamina there will be fluctuation.

This affection is always very severe, and the life of the patient is often in danger; besides, when the abscess forms a passage through the osseous lamina, which covers the mastoid cells, the patient generally is deprived of the use of his ear, in consequence of the ravages which suppuration and caries will have made in the interior of the organ.

Caries almost always accompanies these deep and long continued suppurations; then the cavity of the tympanum may be affected singly, or together with the cellular lamina of the mastoid apophysis; this last is generally implicated owing to its peculiar structure.

We discover caries 1st, by the local pain which the patient experiences; 2d, by the symptoms which may have preceded; 3d, by the nature of the pus which issues from the ulcer; this is ichorous, has a very fetid odour, and stains of a black hue, silver forceps and sounds, as well as portions of the dressings.

Nature very seldom can accomplish the cure of this disease; however, Lesehevin* relates the case of a girl, in whose ears humours collected in consequence of a malignant fever. One of the collections made its way through the auditory meatus, the other penetrated into the mastoid cells, wasted the bone, and formed an opening behind the ear. The carious bone exfoliated, the ulcer healed, almost without the use of any remedies, and the little patient enjoyed the hearing of that side.

This was an extraordinary effort of nature which it would be imprudent to depend upon in cases of which we treat.

We should open the abscess as soon as it becomes manifest, in order to arrest the progress of the injury which the bone

* Prix de l'Acad. royale de chirurg.

suffers. We may employ the caustic, when the disease is the result of a critical or chronic deposition; in other cases we should expose the bone by a crucial incision and by turning back the extremities of the flaps. Afterwards we should apply spirituous desiccatives, such as the commander's balsam, the balsam of Fioraventi, camphorated spirit of wine, or mercurial water, if there exists caries which is not deep; otherwise the actual cautery will be preferable, for we can limit its effects at pleasure. When the abscess has opened spontaneously, we ought to enlarge the fistulous opening, in order to denude the bone, to give issue to the pus, and facilitate exfoliation.

Detergent injections through the artificial opening, and proper dressings, will complete the cure if this disease be merely local; but if the abscess be owing to a syphilitic or strumous taint, it will be indispensable to combat this at the same time.

The following case very well illustrates the disease of which we treat, although we do not report all its details:

"A soldier complained of a discharge from his ear. He heard with his right ear with great difficulty, and not at all with the left for about four years from the time that, a putrid ulcer which was on his right leg having healed, the running from his ear had commenced. This matter was very fetid, and the patient occasionally experienced severe attacks of fever, accompanied with violent pains, particularly in the right ear. These symptoms were alleviated by blood-letting, laxative and refrigerant remedies, and the application of topical emollients and anodynes. These symptoms returned frequently and were always treated in a similar manner. The patient came to the hospital again in 1766. He had a violent fever, and extreme pain. He was bled three times in the space of two days; we employed gentle laxatives and emollient injections, and vapour

baths to the ear; blisters were placed upon the nape of the neck, and behind the ears, and leeches applied. All these means were successively used and repeated several times. None of them however relieved him.

"The patient continuing to suffer and being without sleep, we were obliged occasionally to administer opium; a quantity of ichorous and fetid matter issued from the right ear, and when we pressed the external opening, thick and granulated pus often escaped. At the termination of three weeks we perceived a soft elevation on the mastoid apophysis. We then applied emollient cataplasms and the tumefaction disappeared on the following day. We applied to its seat basilicon ointment, blended with powder of cantharides. Some days after, it again appeared. During this time the fever had been more or less high, according to the severity of the symptoms, and the pain continued to be insupportable. We determined at last to make an incision in the tumour an inch long. A few drops of a thin and acrid humour and nothing more issued from it. We persisted in the application of emollient cataplasms in the hope of relieving the pains, but they continued as intense as usual. Whilst dressing it, M. Jasser (the author's name) remarked, on the lint, a black stain, which caused him to suspect caries of the bone. The membranous expansion, and the periosteum which covered the mastoid apophysis, were detached; and the bone having been exposed, we introduced a sound into the cells of that apophysis.

"A pectoral infusion, nothing else being at hand at the time, was injected through the opening, by means of a syringe, whose canula exactly filled it, but, to the great astonishment of the physician and patient, (the editors say,) all the injection issued instantly from the right nostril. The pain abated, and the wound being dressed in the dry manner, the patient went to bed and slept profoundly during the following ten hours.

Though he had slept on the right side, very little matter escaped from the right ear.

"After dinner, the dressing was renewed, and the same injection repeated. The pain had ceased and the patient experienced only at intervals some transient pain in the ear. The discharge from the right ear diminished daily, the odour and the colour of the matter became better; and in eight days he had neither pain nor discharge.

"The injections were then discontinued and the wound dressed with dry lint only. The bone was kept some time still exposed; but as no more sanies proceeded from it, a cicatrix was permitted to form, which was completed in about three weeks.

"This success (continues the editor of the Journal, from which we learn the fact,) induced M. Jasser to attempt the cure of the deafness, by making an artificial opening on the mastoid apophysis; consequently he operated on the left ear of the patient in the following manner.

"He made, in the skin, an incision which penetrated to the bone and exposed it to the extent of half an inch. He afterwards perforated the mastoid apophysis near its middle; then he introduced into this opening the point of a small syringe, by means of which he injected a decoction, in which a little myrrh had been dissolved. This injection issued from the left nostril. These means being daily repeated, during four days, the patient declared that he heard with the left ear. The remedies being still continued for some time, the patient convalesced gradually; however, the hearing of the left ear was not so completely re-established as that of the right. In three weeks the wound, which was always dressed in a dry state, healed without any exfoliation of the bone. From that period this soldier enjoyed good health and felt no pain in the ear."*

* Journal de Med. Chirurg. et Pharm. fév. 1793.

These observations present several points which merit an attentive examination. We will direct our attention particularly to the operation which was performed on the left ear, and will give a brief historical review of it. We shall speak of its advantages and of those cases in which it ought to be employed, to the exclusion of every other operation. We will not omit mentioning the serious inconvenience which results from it in all cases except those, or rather the single case, which requires it imperatively.

As the ear-ach, which tormented this young soldier during four years, was caused by the drying up of an ulcer of a bad character, the principles of sound practice, would suggest to us the propriety of establishing a copious suppuration in the part where the ulcer had existed. By this means, the patient would have been exempted from long and severe pains, and would not have risked, without the hope of recovery, the use of the organ of hearing and even his life. Even supposing that the re-establishment of the ulcer had not arrested the purulent discharge from the ear, it would have always served as a drain, which would have permitted the surgeon to attack directly the disease of the ear, without exposing the patient to the severe symptoms which had nearly destroyed him. We shall substantiate this assertion as we proceed, by instances derived from authors the most worthy of our confidence.

Otalgia, in the above case, is often assuaged by emollients, soothing remedies, and blood-letting, but the disease in its progress produces deafness, because every time that it recurs the accompanying symptoms are more intense.

Matter, then, makes its way through the membrana tympani, but undoubtedly by an opening very small, since there escapes merely a thin humour, ichorous, and very fetid—circumstances which indicate the presence of that humour in the cavity of the tympanum, and in the mastoid cells. It is only when

one presses upon the orifice of the external meatus that there sometimes escapes a thick and granulated pus.

Finally, the last paroxysm is more protracted and violent. The remedies which had been before employed are repeated without success. New means are resorted to, such as emollient injections and baths of vapour conveyed into the auditory meatus, blisters on the neck and behind the ears,* leeches to the latter places; but none of these means assuage the disease. The pain becoming more intense, and sleep being interrupted, opium is resorted to; a dangerous remedy in inflammatory diseases, especially in those of an organ so sensible and so delicate as that affected in the present case.

At the end of three weeks a soft tumour is perceived behind the ear, upon the mastoid apophysis; poultices are applied which, however, do not prevent its disappearing, to return after a few days. The fever is intense and the pain intolerable. It is determined, at length, to make an incision into the tumour an inch long. Nothing escapes from the opening but a few drops of a thin, acrid humour.

It is evident that this humour came from the mastoid cells, after having passed through the pores in the osseous lamina which covers them. It then occurred to the surgeon to enlarge the incision in two directions, to expose the bone and to perforate the mastoid apophysis to the source of the pus, which was the essential cause of all the sufferings of the patient. The application of emollient cataplasms was continued in the vain hope of allaying the disease, but the pains continued to be as severe as before. It was not till black spots were seen upon the lint with which the part was dressed, that caries of the bone were suspected. It had made such progress, that the probe alone sufficed to penetrate the cells of the mastoid apophysis, and to make an opening large enough to admit the

* We have shown elsewhere that this practice is injurious.

tube of a syringe. The pain ceased after the first injections. The discharge from the right ear diminished from day to day, and at the end of eight days there no longer existed any pain or discharge, and, in the space of three weeks, the patient was completely cured.

It is almost unnecessary, after all that we have said, to remark that as soon as the injections had entered directly to the source of the purulent discharge, the pus changed its character, the ulcer was deterged, and the cure promptly effected, without subsequent mischief, although the case is dated four years after.*

The means which I shall recommend in a similar case are: 1st, the re-establishment of the ulcer; 2d, emollient injections; then, those which are detergent, not by the external meatus, (we have just noticed the little success which attended them,) but by the eustachian tube. These injections, by expelling the pus from the cavity of the tympanum and mastoid cells, drain the source of it, and the cure is as speedy as it is certain. The case which we have reported, together with examples drawn from my own practice, furnishes proof complete of what I assert. 3d. Some time after the cure of the ear is accomplished, the ulcer should be cicatrized, every precaution which art can dictate being observed, to protect the patient from ulterior accidents, of which we have adduced instances.

The idea of perforating the mastoid apophysis was conceived long before it was done by M. Jasser. Riolan proposes in many passages of his writings and particularly in his *opuscules anatomique*, to perforate the mastoid apophysis with a very small stylet, in certain cases of deafness, and in ringing

* This fact, and those which I have reported at page 76 and the following, lead me to believe, that it is less dangerous to suppress chronic issues of pus, of any kind, in young persons than in those more advanced.

and buzzing of the ears, when these affections proceed from an obstruction of the eustachain tube.

Rolfinius advises to open this apophysis with a trochar, in case of dropsy of the cavity of the tympanum and the mastoid cells. Another author, according to Sauvages, advises that it should be practised *pro educendis flatibus in aure tumultuantibus*, (for evacuating flatus producing disturbance in the ear.) "These authors," Sauvages properly remarks, "should substantiate their opinion by observation, or they should not hazard advice which appears at least useless."* He might have said dangerous as we shall prove below.

It appears that M. Jasser was the first who has practised this operation, and that M. Hogstaens followed his example; but the attempt of the latter was not fortunate, for, besides that the patient did not recover his hearing, he encountered a considerable hemorrhage, which hindered the accomplishment of the operation. The injections which were employed gave rise to severe and uncommon symptoms. Every time that the injection was thrown in, the patient complained of agonizing pain in the head, and of buzzing noises in the ear. What was most surprising, however, was that he lost his sight, experienced a degree of suffocation, and fell into a swoon; but, says the author, all this endured but for a few minutes. I think that the length of time was sufficient to endanger the life of the patient. The injections fairly entered the mastoid cells but no part of them issued, either by the mouth, the nose, or by the external auditory meatus.†

M. Loffler has also performed this operation in a case of deafness caused by the translation of a morbific humour to the ear. The injection did not pass out through the mouth, but

* Sauvages. Nosologie, t. ii. note de la p. 219.

† Journal de Méd. Chirurg. et Pharm. fév. 1793.

the patient recovered his hearing. He lost it again, however, when the wound healed. "In consequence of this," say the editors of the journal from which we quote the case, "M. Loffler resolved to open the mastoid process again, and to make an artificial canal, of the diameter of a writing quill, keeping it open by introducing a piece of cat-gut. The success was such that, at length, the patient heard through the opening established in the mastoid apophysis, as well indeed as before these means were employed. He heard when he opened his mouth, and when the sound was transmitted by the medium of the eustachian tube. It appears that, in this case, the cause of deafness was in the membrana tympani, or in the vicinity of that membrane."*

The cause of deafness, in this patient, was in the eustachian tube, and no where else. If that passage had been free, as the editors of the journal suppose, the injections which were thrown into the mastoid cells, would have passed into the fauces and the nose, which, however, did not occur.

The patient, say they, heard better when he opened his mouth, but this is no proof that the eustachian tube was free, since we may assign a reason for that phenomenon, independent of the eustachian tube, with which indeed it has no connection.

It is undoubtedly true, that we hear better when the mouth is open, but is it because, at the instant, the eustachian tube receives an increased quantity of the rays of sound, which directly impinge upon the organ of hearing? Or rather, as appears more probable, is it because, the mouth being open, the external auditory meatus is more expanded, and less tortuous? To convince himself of the truth of this assertion, any one may make upon himself the following experiment.

* Ouvr. citē, fēv. 1793.

The mouth being open, introduce, as deeply as possible, the point of the little finger into the external auditory passage; then shut the mouth, and you will perceive the finger to be slightly compressed. Now this compression is produced by the condyle of the lower jaw, which tends to press together the walls of the meatus when the mouth is shut. If then we hear better when the mouth is open, I again assert that it is not because the eustachian tube conveys additional rays of sound (undulations) to the immediate organ of hearing, but rather because the external auditory meatus admits a larger column of those rays.

The eustachian tube* is essential to hearing, but it has

* M. Perole has proved, by experiments, published in the memoirs of the Societé Royale de Médicine de Paris, for 1779, that the eustachian tube is not a passage by which sounds are transmitted. A single and simple experiment confirms this assertion.

If when the ears are closed, we convey a watch into the cavity of the mouth without pressing it with the teeth, we do not hear the sound of its beat; while the noise will be distinctly heard, if we apply the teeth to the watch-case. This shews that it is not the eustachian tube which transmits the sound in this experiment. This is done by the teeth, which produce a perception of sounds by virtue of filaments from the second branch of the fifth pair of nerves which communicate with branches of the portio dura of the seventh pair.

A long time before M. Perole, Verdue observed: "It is not merely because the air passes along the aqueduct, (eustachian tube,) that the deaf hear better; it is because, in seizing the handle of a musical instrument with the teeth, the thrill is promptly communicated to the jaw, to the temporal bones, and to the little bones of the ear. What favours this opinion is, that those who are not deaf, hear the sound of a lute better when they seize the handle of it with the teeth, and when at the same time the ears are closed. One can also make himself heard by the deaf, by speaking with the mouth in contact with the head, because by jarring the head the impression is communicated to the principal organ of hearing." (Traité de Physiologie, t. II. p. 213.)

M. Desjardins, in his treatise on sounds, says that he has seen a deaf-

another office, quite different from that which is assigned to it above. I have indicated it in the note to page 48, of the first section.

The illustrious Morgagni treated of the diseases of the ear and examined minutely the structure of the mastoid apophysis. His researches, on this subject, instead of rendering him favourable to the operation of which we have spoken, induced him to condemn it, as being a dangerous proceeding. This operation, indeed, often fails, in consequence of the peculiarities which are frequently met with in the structure of the mastoid apophysis. Morgagni and Hogstroem found septa in it, which prevented the communication of the cells.

Another circumstance which may render the perforation of the mastoid apophysis useless, is that the whole body of it is sometimes compact. M. Adolphus Murray, relates an instance, as follows.

"There is sometimes a case, though rare, of which, however, I have instances in my cabinet, in which the mastoid apophysis is compact; so that, so far as we can ascertain, it is not possible to find in it any cavity, or consequently, any communication with the cavity of the drum."*

Independently of these inconveniences, the application of the trepan upon the mastoid apophysis is attended with very great danger, to which the following occurrences may give rise, viz. hemorrhage, pain, spasms, convulsions and suffocation.

mute give signs of great fondness for music, by holding a key in his teeth, the extremity of the key touching the instrument. The musician executed a very melancholy adagio; mean-while the deaf-mute gave unequivocal signs of melancholy emotions. This piece was followed by a very lively allegretto, and the deaf-mute, all at once, began to smile. "The sensation which he experienced" says M. Desjardins, "was owing to a trembling produced by each note." (Thère. sur les songes, Monsellier.)

* Journal de Médicine, fev. 1793.

Tissot, in his life of Zimmerman, reports that the Baron de Berger, physician to the king of Denmark, died a victim to this operation.

All these dangers did not dissuade Arnemann,* Professor of Medicine at Gottingen, from advising this operation. He reduces the cases, in which the perforation of the mastoid apophysis may be useful, to five.

1st. When there is complete deafness, or when deafness pertinaciously increases.

2d. When mucous fluids, which are secreted in the ear, remain there and produce congestion.

3d. When the ears are painful, and there is felt in them a continual ringing.

4th. When the eustachian tube is obstructed by mucus, or other fluids which may be removed by injections.

5th. Finally, when the cells of the mastoid apophysis contain purulent matter, and when they are carious.

These cases are absolutely the same as those published in the Memoires de l'Académie de Suède, Nos. 3, 4 and 5, translated by M. Martin, former physician to the military hospital of Thionville. M. Arnemann has omitted only the case in which it is performed for the purpose of relaxing the membranes and the other soft parts of the drum of the ear, and giving pliancy to the small bones of the ear.

We proceed to examine the six varieties of disease, for which the operation under consideration is proposed.

"1st. When there exists complete deafness, or deafness which gradually increases."

What has there been stated above in regard to the causes of such a species of deafness, that an operation, which may be attended with such severe and even fatal results, should be

* Bibliothique germanique, t. 2.

recommended with so little reflection? and that, for the purpose of accomplishing nothing more than can be done by means more simple, more mild, and by no means dangerous, such as injections into the interior of the ear, through the eustachian tube. If these, in consequence of some difficulty not often encountered, cannot be performed, it would then be better to practise the puncture of the membrana tympani, and inject the ear by the external meatus. The last method is incomparably less dangerous than trepanning the mastoid apophysis.

"2d. When the mucous fluids, which are secreted in the interior of the ear, remain there and produce congestion."

In the case supposed, I admit that injections thrown into the artificial opening, made in the mastoid apophysis, may effectually remove the mucus accumulated in the cavity of the drum and mastoid cells, and even cleanse the eustachian tube; but, I cannot too often repeat it, to what pain and danger will he not expose his patient? It is in this case that the method of injecting the ear, which we shall propose, will be attended with complete success.

"3d. When the ears are painful, and when a continual ringing is felt in them."

In this case the remedy may be pronounced worse than the disease. However, if there was any hope of curing the patient, there would be some propriety in proposing a severe remedy; but there is nothing more uncertain. In such a case, if, after the employment of general remedies, the pain and the ringing persist, proper injections, thrown into the ear through the eustachian tube, will be successful. I have given instances of their success.

"4th. When the eustachian tube is obstructed by mucus, or other humours which may be removed by injections."

It cannot be doubted that, in this case, as in the preceding,

injections by the eustachian tube are, in all respects, superior to the perforation of the mastoid process, and that they ought to be preferred.

"5th. When it is necessary to relax the membranes and other soft parts of the drum of the ear, and give pliancy to the small bones of the ear."

Here, again, is a case for the employment of emollient injections by the eustachian tube.

"6th. Finally, when the cells of the mastoid apophysis contain a purulent fluid, and when they are carious."

In the latter case, the perforation of the mastoid apophysis is infinitely less painful, and the danger is nothing, because nature accomplishes nearly the whole. The utility of the operation also corresponds to its necessity, and it deserves to be preferred to all other remedies. The reasons why it is preferable are so obvious that I think it useless to designate them.

CHAPTER III.

On dropsy of the tympanum and mastoid cells.

Valsalva has often remarked, that in acute diseases there often occurs either some difficulty of hearing, or patients become quite deaf.* Sometimes these disorders survive the diseases which produce them. The same author discovered, in such cases, extravasations of water in the cavity of the drum and in the mastoid cells. This affection may supervene upon an internal catarrh, or upon a blow or fall directly upon the ear.

The signs which indicate this watery collection are almost identical with those which characterise a catarrhal affection.

* There are but few practitioners who have not noticed the same thing.

Dropsy, like the latter affection, is accompanied with indistinctness of hearing, and with pain in the head. When the patient perceives a degree of tension, weight and a kind of roaring deep in the ear, it is not uncommon that the previous affections facilitate the diagnosis. It was thus that Valsalva discovered the formation of a serous congestion in the cavity of each typanum, at the conclusion of a fever.

This disease is often spontaneously dissipated in consequence of the escape of drops of water, which are seen to flow from the nares or from the external auditory passages, when the head is lowered. The following case, which Dr. Perreymon, physician at Lorgues, department of the Var, procured for me, is a proof of the fact.

"André M***, fifty-five years of age, of a lymphatic temperament and somewhat fleshy, suddenly, and without any known cause, became deaf in both ears. This deafness was accompanied with vertigo and pain in the head. There escaped from the two auditory passages, especially from the right, a limpid serosity which wet several large linen pledgets, and flowed for seven or eight days. At the end of this time, the deafness and other symptoms disappeared."

This considerable quantity of serous fluid did not flow merely from the auditory passages; the cavity of the tympanum and the mastoid cells furnished the greater part of it. The deafness and the symptoms which preceded the discharge, clearly prove it.

If the serosity does not make its way through the pores of the membrane of the tympanum as in the preceding case, and the eustachian tube is obstructed or obliterated, the watery collection cannot be dissipated but by opening a passage for it.

Three methods of accomplishing this object present themselves: the puncture of the membrana tympani; perforation of

the mastoid apophysis; and injections, such as we shall propose.*

The latter method should be preferred to the two first; but should we not be able to remove the obstructions from the eustachian tube, a thing of rare occurrence, we ought to resort to the operation of puncturing the membrana tympani. As to the perforation of the mastoid apophysis, it should be rejected for reasons which I have alleged in the preceding paragraph.

If the disease is not maintained by relaxation of the mucus membrane which lines the tympanum and the mastoid cells, or by the rupture of some lymphatic vessel, which the indicative circumstances preceding the dropsy may suggest, the simple evacuation of the water will be sufficient to cure the disease. But if, on the contrary, one of the causes named has given rise to the watery collection, we must have recourse to injections slightly tonic, as those of the mineral water of Balaruc and Baréges, with a few drops of ether, a decoction of cinchona carefully filtered, &c. &c. It will not be improper to maintain, for some time, a caustic issue or a seton in the neck.

The treatment may be concluded by the use of mild purgatives, given at considerable intervals, at least of five days.

* The idea of evacuating a collection of water contained in the cavity of the drum by injections, seems, perhaps, paradoxical and erroneous, but it will cease to appear so if it be observed that when the water which is contained in that cavity cannot escape by its specific weight, it is because there is some obstacle present in the eustachian tube; such as mucus, excrementitious matters, or swelling of the pituitary membrane which lines the interior of the tube. The injections, by removing these obstructions, open a passage for the fluid contained in the drum.

CHAPTER IV.

On extravasation of blood into the cavity of the tympanum and mastoid cells.

Stenon and Morgagni state, that blood may accumulate in the cavity of the tympanum. Mr. Cooper reports an instance of it, accompanied with details which leave no doubt in regard to the existence of such a cause of deafness. We have quoted it, at length, at page 61 of the first section.

From this fact it is obvious that a blow, or fall upon the head, may cause an effusion of blood into the cavity of the tympanum and mastoid cells.

If, then, in consequence of these accidents, the patient bleeds from one or both ears, and becomes deaf, the deafness may depend upon the formation of clots in the external meatus; but if, after they are removed, the deafness continues with the same intensity, we shall have reason to believe that the immediate cause of the affection is extravasated blood, coagulated, perhaps, in the cavity of the tympanum and the mastoid cells. All doubt in regard to it will be removed, if, on injecting warm water into the interior of the ear, through the eustachian tube, the liquid issues bloody, or bringing with it small clots.

The prognosis founded upon this cause of deafness is as easy to be ascertained as is the diagnosis. We may pronounce, with confidence, that the deafness which depends on a collection of blood, in the above named cavities, may be cured by the means which we shall point out.

Treatment. I shall take it for granted that the means proper for preventing, or dispelling the symptoms of cerebral concussion, and the extravasation of blood in the cavity of the cranium, have been employed with success, and that there

remains nothing more to be attended to but the collection of blood in the cavity of the tympanum and mastoid cells.

In the case mentioned above, Mr. Cooper perforated the membrane of the tympanum to give exit to the extravasated blood. He succeeded, because the blood was still fluid. But if it had become solid, the perforation alone would have been insufficient. It will be unnecessary, as I think, to enter into any explanation in regard to this.

After having perforated the membrane, it will be necessary for the purpose of dissolving the coagula, to inject warm water into the ear, through the artificial opening. These injections effectually cleanse the tympanum and the tube. But if the extravasation extends even to the mastoid cells, the liquid will not reach it. For this assertion, we have given reasons elsewhere. The blood stagnating in these cavities, irritates them and excites inflammation; hence will arise long-continued suppuration, abscesses behind the ear, caries, perhaps destruction of the organ, and consequently deafness.

The mode of treatment by injecting the ear, which I propose, is more simple, free from all inconvenience, is unattended with any danger to the patient, and the cure will be more prompt and certain, because the injections will penetrate wherever the blood is extravasated. Warm water will suffice to relieve the organ of the blood which oppresses it, and will restore it to its natural condition.

CHAPTER V.

On the accumulation of mucus and ceruminose matters in the cavity of the tympanum and the mastoid cells.

Mucous, ceruminose, and even lymphatic fluids are susceptible of being rendered thick and tenacious. This is a quality of their constitution, and of their chemical properties. It is not surprising, therefore, that their stagnation merely, in a warm situation, should tend to render them concrete, and thus to produce deafness.

We know that, at an early period of life, mucus predominates over all the other humours. Defluxions and catarrhal inflammations are particularly troublesome to infants. At so tender an age they are unable and know not how to expectorate; the mucus of the fauces, and of the nasal fossæ, secreted in abundance, accumulates about and within the orifice of the eustachian tube and obstructs it; hence the stagnation of mucus in the cavity of the tympanum and the mastoid cells. The more fluid parts of these humours are again absorbed, and the more solid will concrete and cause deafness.

This is the case, for the most part, with infant deaf-mutes, that are supposed to be deaf from birth, from fault of primary organization.

These causes of deafness are very frequent, especially with infants of a lymphatic constitution, and who are often affected with herpetic eruptions on the head and face.

The ancients were not ignorant of these causes of deafness, but they supposed that when, by lapse of time, this matter had become hard, it was impossible to soften or dissolve it, and hence that this variety of deafness was incurable. *Surditas genita a crassis et pituitosis humoribus internam auris partem occupantibus immedicabilis est, si sit inveterata. Inveterata dicitur quæ excessit duos annos; tam longo enim tempore imbibitur in*

illis partibus humor, ita induruit, ut vix imo nunquam possit, emolliri et discuti.

The mucous humour which accumulates in the cavity of the tympanum and the mastoid cells may exist there in different states: 1st, merely condensed; 2d, concrete or hardened. In the latter case, as well as in the former, the matter fills these cavities, but often it only over-spreads the internal surface. The ceruminose matter often occasions the latter condition.

The symptoms, characteristic of these causes of deafness, are derived from the peculiar traits of those diseases which may have preceded them; such as stuffed nostrils, frequent defluxions, otalgia; the existence, or the mere vestiges of scabies or scrofula. If to these circumstances, there are added a serous or mucous discharge from the external auditory meatus; if, on blowing the nose, or on closing the mouth and nose and making a strong expiration, the air does not pass into the ear; or if an injection thrown into the eustachian tube encounters some firm obstacle, we shall be certain that the cavity of the tympanum is obstructed by mucus. If injections penetrate into this cavity as if it were unobstructed, and if the organ remains insensible, or almost so, to injections, we may presume, from these facts, that the concrete substance merely lines the cavity which we inject. This presumption will result in absolute conviction, if, after injecting for some days, we observe small bodies, of a yellow colour and friable consistence, to escape from the mouth and nose; also mucus covering the surface of the water which returns after the injection. We may regard this circumstance as a pathognomic sign of that particular cause of deafness of which we are speaking. The following facts substantiate the assertions advanced in this paragraph.

Mlle. G*** de Sainte-Etienne, of the department of the Loire, aged 24 years, of a mucous habit, although of a florid

complexion, came with her mother to consult me, March 12th, 1815. She had very considerable difficulty of hearing in both ears, with mucous obstructions of the external auditory passages. She could not be made to hear what was addressed to her in a loud tone and very near the ear, because mucous matters, much more dense, occupied at the same time the eustachian tubes, the cavities of the drum, and the mastoid cells.

The presumed cause of the deafness was a suppression of perspiration, caused by attending a ball.

Injections of warm Balaruc water cleansed the auditory passages of the mucus which filled them, and of the white pellicles which lined them, but the hearing was not at all improved.

Injections thrown into the eustachian tube could not at first be made to enter the cavity of the tympanum, although I pushed the piston of the syringe much more strongly than usual. The liquid regurgitated, in part, between the orifice of the hollow sound and the pipe of the syringe. It was not till after injecting for some days that a clot, of the form of the stem of a clove, escaped from the right eustachian tube, after my having injected it; afterwards, another clot, of the same form and size, was disengaged from the left. These clots were of a yellowish colour, and of a consistence much more firm than the sputa which sometimes escape, with pain, from the larynx or the trachea. Subsequent injections caused the escape, successively from the one and the other ear, of many other clots, of which the form and size varied exceedingly, but the colour and consistence were always the same.

In proportion as this matter was detached, the injections penetrated into the interior of the ear with facility. The difficulty of hearing slightly diminished, but in a much less degree than I had expected, because I was persuaded that the mucous concretions were the only impediments to hearing.

After the continuance of injections with the water of Balaruc, for a month following, a blister to each arm, then another between the shoulders, and two purgatives after the healing of the last blister, the catarrhal humour had entirely disappeared, without any remarkable change in the faculty of hearing.

Ignorant of the circumstances which had preceded the deafness, and which had been concealed from me, I had had, from the beginning, nothing in view but a catarrh which affected the whole interior of the organ of hearing except the labyrinth. I therefore predicted, prematurely, without doubt, that the young lady would be cured of her deafness. Her parents, with whom she lived during her residence in Lyons, at length told me that she had had, for six years, an attachment of a delicate nature. Her father disapproving of her choice, she suffered severe and deep affliction. It was at this time that her deafness commenced. The first affection was slight, but the infirmity progressively increased to the degree that Mlle. G*** was unable to hear, even when addressed in a high tone and near the ear. I could not, under these circumstances, mistake the influence of a nervous affection.

With a view to attack this disorder, I prescribed whey, sweetened with the syrup of orange flowers, and qualified with a drachm of sulphuric ether to the pint; moderate exercise, a cooling regimen, injections of a decoction of bran and nitre. I employed injections of rose-water, qualified with musk, into the internal ear. All these means, however, effected no change, although they were continued for a month.

A gland, of the size of a bean, situated near the course of the right jugular vein, and an unnatural thickness of the upper lip, led me to suppose that a scrophulous humour might have some concern in the deafness with which the young lady was affected. In consequence of this, I put the patient upon the

use of the syrup de Bellet, in the dose of a table-spoonful, morning and evening, given in a wine-glass of the decoction of bur-dock. This remedy was continued with care for a month, without her having derived any advantage from it.

I should not omit to remark, that the ears were but little sensible to the injections, especially when I threw them into the external auditory meatus.

Another particular worthy of remark, is, that this young lady hears sufficiently well, to this day, when she is addressed close to the ear; it is indispensable, however, that the mouth of the speaker should be placed in contact with the external meatus, otherwise she does not hear at all.

Such is the condition of the young lady at present. Shall we pronounce her disease incurable? I think not. I believe, on the contrary, that a course of treatment, perseveringly directed against the nervous derangement which affects the apparatus of the internal ear, and especially a change of condition favourable to the happiness of the young lady, would be productive of a happy result.*

* We often observe that a depression of spirits, and the grief which springs from unhappy attachments, exercise an influence upon our senses, and produce either an exaltation or diminution of sensibility in the nervous system. Difficulty of hearing may readily arise from moral causes, the pathological phenomena being located in the acoustic nerves. M. Itard cites the case of a nun, who came to consult him for deafness. The first symptoms of the disease had occurred during a period of mental distress which this lady experienced, and they had been followed by deafness from the influence of the same causes, increasing or diminishing with the mental distress, to which the lady was a prey. M. Itard judged it proper to endeavour to dispel the causes which gave rise to the affection. This being accomplished, he had recourse to the hollow sound, through which he directed the vapour of ether into the guttural meatus of the ear with the apparatus, a description of which will be found in this work. At the end of twenty days the hearing was sensibly improved. This treatment was continued some time, and was rendered more active by infusing the leaves

The son of M. Dev. ***, nineteen years of age, had, from his infancy, very difficult hearing, and the disease constantly increased in its intensity. The right ear was affected with an extreme difficulty of hearing, and the left with complete deafness. The young man could scarcely hear the beat of a watch, applied immediately upon the orifice of the latter ear. There had been protracted suppuration, pain, and buzzing noise in both ears.

A tetter, occupying almost the whole scalp, was the supposed predisposing cause of the disease.

Blisters and detergents had been employed, with steady perseverance, but without any success.

On the 27th of September, 1814, I commenced a new mode of treatment. Injections were thrown into the eustachian tube more than a hundred times, but at different periods. The first period, in consequence of the severity of the season, was concluded on the 10th of November of the same year. The second commenced on the 12th of March, 1815, and terminated on the 14th of June following; but at remote intervals there were interruptions of a few days. I injected each ear six, seven, and even ten times at a sitting. The water of Balaruc was the only liquid injected during the course of the treatment, either by the external meatus or by the eustachian tube.

At the twenty-fifth sitting, the patient discharged from the right nostril, together with the water injected into the

of rue in the ether. At the end of a month, the benefit derived from the vapour baths of ether was so considerable, that the lady, who before could not hear except when she was spoken to in the ear very deliberately, and with a loud voice, conversed freely in an ordinary tone, only, however, by speaking near.

M. Saissy might also have used, in this case, electricity, from which the best effects have been derived in similar cases; or what might be still better, tobacco smoke, drawn in by the mouth and forced into the eustachian tubes. Th. P.

eustachian tube of the same side, a ceruminose concretion, of a reddish colour, of the breadth of a large bean, of the thickness of thin paper, and of friable consistence. At the twenty-sixth sitting a similar concretion escaped, in the same manner, from the left ear.

These concretions were followed by others of the same nature, but not so large. There afterwards escaped at different intervals, a substance of the colour and form of coarse tobacco-scrapings.

Hearing was re-established in proportion as the obstruction was removed. At this time the young man hears with the right ear as if he had never experieneed any disease in that organ, while, with the left ear, he hears the beating of a watch at the distance of two feet.

Finally, this young man who, before the treatment, could not enjoy the pleasure of conversation, in company, now takes part in it like any other individual.

There remains in the external auditory meatus of the left ear, a puriform and very offensive discharge. It has resisted blisters applied to the arm of the same side, repeated purgatives, injeetions of the mineral water of Balaruc, the decoction of barley with honey, and deeoction of cinehona. I did not wish to rely upon tonics, and I abstained from the employment of astringents and discutients, fearing the repulsion of the humour upon the immediate seat of hearing, or upon some organ essential to life, a repulsion of which the records of our art furnish but too many instances.

CHAPTER VI.

On obstructions of the cavity of the tympanum and the mastoid cells, by calcareous substances.

Arnemann* found, in the cavity of the tympanum, a substance resembling chalk. He supposed that those who had been affected with venereal diseases were the usual subjects of this affection.

I knew a man, fifty years of age, who was very deaf from the time that he was fifteen years of age, in consequence of frequent attacks of the venereal disease. I should observe that this individual never had chancre, or ulcer of the throat, or of the nose; so that the deafness could not be ascribed to closure of the opening of the eustachian tube. It is more probable that the disease was owing to an accumulation of a chalky matter, like that described by Arnemann, in the tympanum and the eustachian tube.

Hogstroem† saw a case of complete deafness resulting from venereal affections.

Leschevin says, that "if, by any cause which may occur, the membrane which lines the mastoid cells, excretes a preternatural quantity of mucus, as happens to the pituitary membrane in catarrh of the nares, it is certain that the cavity of the tympanum would be overflowed, and that the membrana tympani, and the membranes of the foramina, rotundum and ovale, would be drenched and relaxed; a circumstance which would necessarily render hearing difficult. Besides, this fluid might, from some morbid peculiarity, become concrete. I doubt not, for instance, that the inspissation of it, caused by a venereal taint, and its retention in the cavity of the tympanum

* Bibliothèque Germanique, t. ii.

† Journal de Med. chirurg. pharm. fév. 1793.

and in the eustachian tube, may be one of the most frequent immediate causes of venereal deafness. It has been long since remarked, that the venereal virus has a particular affinity for the mucous fluids, such as those of the interior of the nose, of the throat, and of the palate. It is for this reason that these parts are so often affected with lues. The fluid of the mastoid sinuses being of the same nature, it is not surprising that the venereal virus should readily blend itself with it."*

Ambrose Paré thought that syphilis might be the cause of deafness. "We see," says that great man, "persons affected with the venereal disease, losing their hearing in consequence of severe pain in the head."†

Sennert‡ reports, according to Platerus, that an Abbot, in consequence of venereal disease, became blind, deaf and dumb.

It is, as I believe, sufficiently established that syphilis has a marked influence upon the lymphatic and mucous humours, which it tends to render thick and concrete. It is not surprising, then, that this virus, being conveyed into the cavity of the tympanum and the mastoid cells, should coagulate the mucous fluid which moistens those cavities, and thus give origin to the cause of deafness with which we are occupied. But by what signs shall we be able to recognise this variety of deafness.?§

* Prix de l'Acad. royale de chirurg. t. iv. in 4to.

† Ambrose Paré, liv. 19, p. 545.

‡ Sennert, cap. vii., p. 114 et 115.

§ We have here a specimen of the ancient humoral pathology which still, in some degree, prevails on the continent of Europe. The author evidently believes in the residence of specific poisons (humours,) in the circulating, and the secreted fluids. The reader will have frequently noticed that he speaks of the repulsion of these humours from parts upon which they may have fallen, and of this repulsion being a source of disease in some remote part on which the morbific humour may have been again precipitated.

The venereal virus has no affinity whatever for the mucous *fluids*, but the

"If deafness," says Leschevin, "has been preceded by any venereal disorders, and more especially if it is accompanied by symptoms of lues, we shall have reason to believe that it arises from an accumulation of inspissated fluids in the drum."*

A scurfy tetter upon the lobes of the ears, when it concurs with symptoms indicative of syphilis, affords strong presumption that the deafness is owing to a sediment deposited in the cavity of the tympanum and the mastoid cells, in consequence of that disease.

According to Nisbet,† the deafness which is dependent on syphilis, is generally preceded, for many months, by a noise, or ringing in the ears. This ringing is accompanied with severe pains. When suppuration supervenes, or indeed without this, there is an ulcer slowly formed, which produces erosion of the organ. Often, also, this variety of deafness immediately springs from an affection of the guttural orifice of the eustachian tube.‡

morbid action of lues in some of its stages has a decided partiality for the mucous membranes. All the ramifications of this tissue may participate in the morbid changes. The mucous lining of the ear, as well as that of other organs, may become morbidly excited, thickened, and may secrete a morbid mucus, redundant in quantity and of a caseous consistenee.

The same remark is true in regard to gonorrhœa. All the mucous membranes may, in some degree, partieipate in the morbid condition of the lining membrane of the urethra affected with protracted gonorrhœa or with gleet. I have several times witnessed a degree of deafness from this source, and have now under treatment a case of this character.

N. R. S.

*Prix de l'Acad. royale de chirurg. t. iv. in 4to.

† Traitē des maladies veneriennes, p. 243.

‡ That variety of deafness arising from an old venereal taint, the progress of which has not been arrested, and which does not proceed from ulceration obliterating the eustachian tube, most frequently arises from caries of the mastoid portion of the temporal bone, the little bones of the ear, or some other osseous part concurring to form the structure of the in-

A symptom which is common to obstruction of the cavity of the tympanum and the eustachian tube, whatever may be its cause, is that, on shutting the mouth and nose, and then making a strong expiration, the air is not felt entering the ears, nor striking upon the membrana tympani.

Treatment.—We shall here consider merely the obstruction, whatsoever may be the causes which have produced it. We shall suppose that the previous diseases have been treated and that nothing more remains to be done but to remove their effects. This will be accomplished by throwing injections into the ear in the manner which I shall hereafter describe.

At first, these injections should be made with warm water, which should be continued until the cavities are free from the obstructing matter which fills them. This may be ascertained: 1st, by the facility with which the liquid passess through the tube and into the cavity of the tympanum; 2d, by the fact that the patient perceives the liquid striking upon the membrana tympani; 3d, that he experiences a pleasant warmth in the interior of the ear, with a kind of tickling in the mastoid region.

ternal ear; or more especially from the pus produced by this caries, and which is effused into the cavity of the tympanum; sometimes it arises from these two circumstances combined.

Whatever it may be, the first indication to be answered, is to arrest the progress of the affection, by prescribing, without delay, a treatment suited to the nature and chronic character of the disease, not regarding the second indication, which is to restore the hearing, till we have succeeded in neutralizing this source of mischief.

A remedy, which in this case aids in fulfilling both indications, is the injection into the ear, through the eustachian tube, of a mixture of the liquor of Van Swieten and a decoction of mallows or flaxseed, in proportions adapted to the condition of the subject. With these means we may arrest the progress of the caries by acting directly on the diseased part, and cleansing the cavities of the internal ear, where the effusion has taken place. Th. P.

These are the signs which indicate that the obstruction no longer exists.

When this is accomplished the patient hears acutely; but if there still remains a degree of confusion in the perception of sounds, caused by engorgement of the part, there should be added to the warm water a few drops, either of the tincture of musk, sulphuric ether, lavender water, or Hungary water; but the mineral water of Balaruc or Barége will be attended with more remarkable and prompt effects. We have reported an instance which was furnished us in the case of Berthon D.*

Perforation of the mastoid apophysis,† electricity‡ and galvanism,§ have been recommended for the cure of that variety of deafness with which we are now occupied.

We have given our opinion in relation to the first of these means. We shall show, below, the inutility and danger of the two latter.

CHAPTER VII.

On the diseases which affect the small bones of the ear.

The small bones of the ear are subject to defects of primary organization, to caries, and to anchylosis.

M. Lebouvier-Desmortiers, on having carefully opened the cavity of the tympanum in a calf, for the purpose of observing the small bones of the ear in their relative position, found the incus articulated with the head of the malleus in the natural

* See chap. ii. of this section.

† Arneman, Biblioth. Germanique t. 11.

‡ Berthelon on the electricity of the human body, t. 1. p. 502 and the following.—Manduit, mem. of the Royal Society of Med.—Lebouviar Desmortiers, considerations on congenital deaf-mutes.

§ Grapengiesser, Bibliotb. girm. t. viii.

position, but the handle of the malleus was entirely absent. "Thus," M. Lebouvier says, (supposing that the handle of the malleus was naturally absent,) "the calf to which this ear belonged was born deaf, and would have continued so, during its whole life. Any person who might have the same defect, or any other equivalent to it, would be deaf and dumb."*

It is to be desired that the author of this anatomico-pathologic observation had stated whether this imperfection existed in both ears or only in one; for if the defect of organization existed but in one ear, the animal would not have been deprived of hearing, and a person who should be in the same condition would neither be deaf nor dumb.

But is it perfectly certain that merely this defect of organization would be sufficient to destroy the function of the organ of hearing? To me it appears doubtful. The observations of Riolan, Cooper, &c. &c. in regard to the partial and complete destruction of the membrana tympani, induce me to believe, that the defect of the handle of the malleus is not, and cannot be, a cause of deafness, especially of complete deafness; for when the membrane is destroyed, the attachment of the malleus also is, and hence the bone becomes useless in regard to the perception of sounds; nevertheless, individuals still preserve, at least in part, the faculty of hearing.

The little bones in question are sometimes affected with anchylosis, Ruysch† says that he has seen, in the body of a new-born infant, these bones irregularly joined together contrary to their natural order.

The illustrious J. Louis Petit cites an instance from his own experience, in the first volume of his posthumous works.

Valsalva found the stapes grown to the foramen ovale

* Lebouvier-Desmortiers, considerations upon deafness, &c.

† Palfin, anatomic chirurgicale, t. i. p. 430.

(*Tractatus de aure humana, chap.* ii, *sec.* 10,) and Reimaner found the bones of the ear wholly wanting.

Baillie has, in three instances, seen the small bones of the ear smaller than natural.

M. Richerand says "The destruction of the small bones of the ear produces deafness by opening the foramen ovale. The liquor of Cotunnus, which fills the cavities of the labyrinth, flows out and deprives the auditory nerves of the liquid necessary, both for the purpose of preserving them in the moist and supple state requisite for the perception of sounds and for transmitting the vibrations of the air."*

It is impossible, as I believe, to distinguish whether the deafness is owing to anchylosis of the small bones, or to some other disorder of these parts.

It is obvious, however, that the species of deafness which proceeds from either of these causes is incurable by any known means. Although we might cure the caries by means of detergent injections, the deafness would remain.

CHAPTER VIII.

On diseases which may affect the muscles attached to the small bones of the ear.

Palsy and rupture are the most frequent affections of the muscles under consideration.

There are many causes which may give rise to palsy, but the most frequent are adynamic and ataxic fevers, also rheumatic affections. Among the cases which I have accumulated in relation to this subject I will confine myself to the following.

*Nosographie chirurgicale, t. ii, p. 135.

Josephine P***, 36 years of age, of the department of Jura, suffered in 1811, an adynamic fever, which rendered her very deaf. The deafness was accompanied with a very troublesome buzzing, and with considerable pains in the head.

A seton in the neck, a caustic issue on the left arm, and many other remedies applied to the ears, and introduced into the aditory passages, were attended with no satisfactory result.

On the 14th of April, I commenced the treatment, by throwing injections into the eustachian tube through the nasal passages. These injections were composed successively of warm water, to which I added a few drops of lavender water, then of ether, tincture of musk, and finally the mineral water of Balaruc.

I continued this treatment for two months and a half, at the end of which time, the buzzing sound, and the pains in the head had ceased; but hearing was but little improved. Six months afterwards, Josephine P*** wrote me that she heard very well, and that her hearing every day became better. Finally, at the commencement of the present year, 1817, she came to see me and declared that she heard as well as she had done before the disease which had caused the deafness.

The following case bears some analogy to the preceding:

M. Malibran, surgeon to Saint-Rambert-l' Ile-Barbe, sixty-two years of age, was affected with a difficulty of hearing in both ears, with a considerable degree of the buzzing noise. This infirmity every day increased. The advanced age of the patient had nothing to do with the disease, a rheumatic affection being the cause of it.

The buzzing sounds were strong and constant. The patient was so deaf that he could hear only when he was addressed in a loud voice, and very near the ear.

On the 25th of June, 1816, I commenced the treatment, (which consisted merely of injections of the mineral water of

Balarue, thrown into the interior of the ear, through the custachian tube.) I continued it till August 3d, of the same year. After the sixth sitting, the buzzing noises diminished, and they were entirely dissipated by the continuance of the injections. Nevertheless the hearing had gained but little when we discontinued the treatment, but a short time after M. Malibran remarked that it was more perfect, and that it gained strength every day, although the season was rigorous, and although, on account of his peculiar situation, he was obliged to expose himself to all the inclemency of the weather. Finally, the patient hears at this time as well as any individual of the same age, who has experienced no defect in the organ of hearing.

These facts tend to prove that in most cases, although the deafness may but very slowly yield, during the course of the treatment, hearing may finally be re-established, if the buzzing noise in the organ has ceased or nearly so, by the influence of the above treatment.

The last case also proves that deafness may be treated with success, at any period of life, when the cause of it is accidental.

CHAPTER IX.

On the buzzing, (bourdonnement) or roaring noise which affects the ears.

This disease consists in the perception of sounds which do not really exist, or, at least, which do not exist exteriorly.

The different kinds of buzzing noise are distinguished by the nature of the sounds which the patient hears, or thinks he hears, and the causes which give rise to the disease.

The morbid perception is called roaring (bombement) when the sound heard is grave; ringing, (tintement) or hissing, if it be acute.

From these peculiarities, authors have derived the same number of distinct forms of disease, although, in reality, they are merely so many varieties of the same disease; "so nearly the same, says M. Itard, that we often observe them to occur successively, in the same individual, and to be exchanged, irregularly, the one for the other, in a short space of time."*

When the sounds have a real existence, which results from the physico-vital laws, the disease is designated under the name of *true buzzing* (bourdonnement vrai.)

If on the contrary, the buzzing cannot be accounted for on the principles of acoustics, it is termed *false.*

Each variety of the buzzing noise has its peculiar causes. The true buzzing arises from various causes, which may be referred, according to Itard, to two general ones, the circulation of the blood, and agitation of the air.

1st. The blood circulating in the ear, or its vicinity, may produce the true buzzing by the aneurismal dilatation of some vessel, and then the noise which is heard is synchronous with the pulsations of the heart. It never diminishes—has no intermission, and sometimes becomes so intense that it may even be perceived by the attendant. Duverney cites a very curious fact in relation to this subject.

"I have witnessed," says that author, "the case of a lady of Picardy who perceives, on the least violent exercise, a pulsation in the ear so troublesome, that it appears as if she had a pendulum attached to her head. This pulsation is also heard by those who approach her. The beating is nothing more than that of a dilated artery, because it always accords perfectly with the pulsation of the heart."†

Plater and Mercurialis have observed the same phenomena. I have had occasion to see two persons in whom the buzzing,

* Dictionnaire des Sciences médicales, t. iii.

† Duverney, Traité, des l'organe de l'ouie, p. 166.

with which they were afflicted, was owing to this cause. But in these subjects it did not exist in the same degree of intensity, as in those of whom mention is made by the authors quoted above.

2d. The true buzzing may also arise from the increased impulse of the blood in the arteries of the head, as occurs in violent fevers, or in a paroxysm of anger; but the morbid sensation which is merely the effect of the fever, or the fit of anger, ceases together with the cause.

3d. A state of permanent plethora, or an accidental repletion of the blood vessels of the head also gives rise to the buzzing sound.

4th. The immoderate use of spirituous liquors, by causing a determination of blood to the head, gives rise, not to a buzzing, but to a kind of hissing sound.

5th. The air which passes through and fills the passages and cavities of the ear, if it be driven about, or if it be confined in an unaccustomed manner, becomes, in the interior of the organ, a cause of the buzzing sensation.

6th. Mucosities, which partially close the orifice of the eustachian tube, and tumours which compress it, produce the same phenomena.

7th. Diseases of the auditory nerve, when they are not very intense, also produce the buzzing noise in the ear. I give instances of it in the sixth section.

The *false buzzing* most commonly attacks persons whose ears are very sensitive. It is generally produced by very long continued and violent sounds, such as the sound of bells, the firing of large pieces of artillery; "or especially," says M. Itard, "when the sounds, although not violent, yet, from peculiar accompanying circumstances, have left a strong impression upon the mind."*

* Dictionnaires des Sciences médicales. t. iii.

The buzzing which arises from such causes is idiopathic. It is symptomatic when it depends; 1st, on nervous diseases such as hysteria, hypoeondria, eonvulsions, mental alienation; 2d, when upon gastrie derangements, nervous and bilious engorgement; 3d, upon eaehexy, produced by copious hemorrhages.

By what symptoms shall we distinguish these various kinds of morbid sensation in the ear? It appears to me that, by the aid of the following data, we may so characterize them that one need not be confounded with the other; for example:—1st, if the buzzing come on by degrees and without manifest cause; 2d, if it depend upon cerebral plethora (which is known by the heaviness of the head and suffusion of the face) the vessels of that part and of the temples being engorged; 3d, if it be the result of some disease of the ear or of the eustaehian tube; 4th, if an adynamic or ataxic fever has given rise to it, we may be sure that the buzzing is *true*. But the buzzing sometimes causes, and is still more frequently a symptom of deafness; in regard to this it is important that we should diseriminate.

M. Itard appears to me to have very well distinguished the idiopathie buzzing from the symptomatic. "These," says he, "are the symptoms by which I recognise its idiopathic character. The deafness diminishes and augments with it; if there is any intermission hearing is at the same time restored. Deafness which is caused by the buzzing presents this peculiarity also, that it does not disturb, at least at the eommencement, the perception of sounds or noises, however feeble or distant they may be, but merely destroys the pereeption of a word, or sound, uttered at the same time with others, they being in some way blended and eonfused, as in general conversation, or as in a song with accompaniments."

The symptoms which eharacterize the false buzzing are

derived from the causes which produce it, and of these causes there are two varieties, the idiopathic, and the symptomatic. 1st. When the buzzing attacks very nervous persons, no other cause having concurred. 2d. When it occurs after having been preceded by loud and long-continued noises, such as the ringing of bells, or the firing of artillery. 3d. When it is the result of a fright, occasioned by some extraordinary noise, although not very loud, like that which wakes, in alarm, the mother of an infant, whose couch has become the prey of the flames,*—the false buzzing which one of these causes may have produced, is the idiopathic.

But it is symptomatic when it proceeds from hysteria, hypocondria, mania, convulsions, from worms in the stomach and intestines, or when it results from copious hemorrhages or from strong emotions of the mind, &c.

Treatment.—We should never lose sight of the causes of this affection, of whatsoever variety it may be. If the morbid sensation be that which we have termed *true*, and if it depend on general plethora, bleeding from the arm or foot, repeated according to circumstances; pedeluvia morning and evening; cooling and emollient injections; refringent drinks, such as chicken water, or whey qualified with nitre, and a vegetable diet, will remove the cause of the buzzing.

When the buzzing is owing to local plethora, we should open the jugular vein, or we should apply leeches to the neck and temples; then, recourse should be had to cold lotions applied to the head and neck, such as cold water and ice.

There are only palliative remedies, when the dilatation of an artery is the cause of the buzzing: 1st, all violent exercise, such as riding on horse-back, and running on foot; 2d, singing, public speaking, playing upon wind instruments; 3d, the use

* Ouvrage cité.

of spirituous liquors—in a word, every thing which may accelerate the circulation of the blood in the vessels of the head must be interdicted.

When the disease depends upon some obstruction in the canal of the eustachian tube, or in the cavity of the tympanum, injections thrown into the tube, by diluting and washing away the deposition, remove the obstruction and dispel the buzzing sound.

At the termination of an adynamic or ataxic fever, or a catarrh of the internal ear, there often remains a buzzing more or less considerable. Warm lavements of the mineral water of Balaruc, Baréges, or of Aix in Savoy, or water qualified with ether, thrown into the interior of the ear in the form of an injection, will be attended with very good success. I have cited many instances of it in the second section.

In the false buzzing, of which the cause is a nervous disease, such as hysteria, or hypocondria, "it is necessary," says M. Itard, "to have recourse to general remedies, and to make the cure of this affection dependent upon that of the nervous affection. The same treatment is proper in cases in which we recognise as a cause any gastric derangement, or general debility from loss of blood, or from the effect of a scorbutic cachexy."*

But it must be confessed that in a great many instances the morbid perception persists and increases without our being able to ascertain the cause or the true indication. Under such circumstances, a great many remedies have been tried, almost always without success, such as the smoke of tobacco, forced into the ear, or inhaled by the mouth, and propelled into the eustachian tubes, also the infusion of dried trefoil employed in the same manner.

* Ouvrage cité.

SECTION III.

ON THE DISEASES OF THE EUSTACHIAN TUBE.

These channels are essential constituent parts of the organ of hearing. They cannot be affected with disease or even compressed by swelling, or by an excrescence of the neighbouring parts, without materially influencing the function of hearing.

I shall divide the affections of the eustachian tube:

1st. Into those which directly affect this tube, such as an imperforate state of the expanded orifice of the tube, obstruction or obliteration of the canal, and catarrhal engorgement of the same part.

2d. Those diseases which affect the eustachian tube not so immediately, but which nevertheless give rise to deafness, and often to serious diseases of the internal ear, will be the subject of the second part.

CHAPTER I.

On the imperforate condition of the eustachian tube, and the closure of that canal.

Infants are sometimes born with the canal of the urethra imperforate, others with imperforate anus, some with imperforate vagina and os uteri. In the same manner also, there are those who are born with the eustachian tubes imperforate. In the latter case the subjects of the mal-formation are deaf-and-dumb.

Another kind of closure of these tubes which is very fre-

quent, is that which results from inflammation of the throat, as in scarlet fever. I know two persons in this condition, one aged forty years, completely deaf in the left ear ever since the age of nine; the other aged twenty-seven years, completely deaf in both ears, in consequence of the same disease, which she experienced at the age of three years.

The small-pox sometimes gives origin to this disease; an instance of it is to be seen in the Ephemerides des Curieux de la Nature. A young woman, in consequence of small-pox, had an ulcer of the uvula, and afterward an ill-conditioned ulcer of the nose, which attacked the openings of the eustachian tubes and effected the closure of those canals.

"It often happens," says Cooper, "that the cicatrization of venereal ulcers of the throat closes the passage of the eustachian tube, and destroys the faculty of hearing on the side affected."

"I have seen," says Swédiaur, "many instances of deafness and of violent pains in the ears, produced by venereal ulcers which affect the orifice of the eustachian tube."*

If, on shutting the mouth and nose,† and then making a strong expiration, the patient does not perceive the air passing into the tubes, or striking upon the membrana tympani, we may conclude that the tubes are closed. This symptom is common to the congenital imperforate condition, that which is owing to some disease of the throat and the nasal fossæ, and the complete obstruction of these tubes.

We may also ascertain the closure of these canals by probing through the nasal passages. If the orifice of the porch of

* Traité des maladies vénériennes.

† The same author met with a case of complete deafness which was the result of gonorrhœa suppressed by the internal use of turpentine. The patient had no chancre, nor any venereal affection of the nose nor of the fauces.

the tube is not found, it is a proof that the obstruction is located upon the orifice; but often the septum, or cicatrix which intercepts the passage of air, is more deeply placed, and then it forms a species of cul-de-sac, in which the beak of the sound is engaged and an insuperable resistance is experienced. If to this resistance there is added an elasticity and a slight pain in the part which is touched, then there is no doubt that a membranous septum is the obstacle which prevents the ingress of air into the cavity of the tympanum. If we attempt to pass an injection, a resistance is experienced, and besides, nothing passes into the interior of the ear.

I have met with a case perfectly similar in the person of M. D. of A. The left eustachian tube is closed even with the porch of the tube, so that in the right side there is a cul-de-sac about a line and a half in depth.

In the cases which we have stated, hearing may be restored if the obstacle to the perception of sounds belong merely to the porch (pavillon) of the tube, or to but a small portion of the tube, provided, nevertheless, that the immediate organ of hearing is not too much concerned; for then the faculty of hearing is irrecoverably lost.

Treatment.—Two modes of treatment present themselves; puncture of the membrana tympani, and perforation of the membranous septum which closes the eustachian tube.

As to the perforation of the mastoid apophysis, I think that it ought to be rejected as uncertain and dangerous.

Three circumstances in the form of disease under consideration demand the perforation of the membrana tympani:—1st, when the septum which closes the tube is placed on a level with the margin of the orifice of the tube; 2d, when the eustachian tube is obliterated throughout its whole extent; 3d, when the membrana tympani is ossified, and when at the same time, the other parts of the organ are in a natural state. The ope-

ration should be performed in the manner described in the first section.

The other operation has for its object the restoring of the eustachian tube to its natural state. To perform this it is necessary to have a silver stylet, one of the extremities of which is armed with a steel point, like that of a trochar; the other should be made small as is the shaft of the instrument, that it may enter the hallow canula which serves to probe or sound the tube. It is then introduced into the beak of the hollow instrument, (algalie) and the blunt extremity is pushed beyond the external orifice, so that the point of the trochar may be concealed at the beak. The canula being thus armed, is introduced into the nasal fossæ as in injecting the tube. When it encounters the obstacle, which is known by the resistance, by the depth to which the sound has passed, and by the direction of the shaft, which is at the external extremity of the canula, the stylet is to be gently pushed forward till the cessation of resistance announces that the obstacle is overcome. Then the stylet is to be withdrawn, by making the trochar reenter the canula, which serves as a sheath for it. The latter is then removed by employing, inversely, the manipulation by which it was introduced.

The opening which is thus made would soon close again were it left to itself, therefore there should be a tent introduced just beyond the point at which the obstruction existed, and it should be suffered to remain there twenty-four hours. This should be followed by another, and this last by a third and so on, until we may presume that the walls of the eustachian tube are cicatrized.

For this purpose we substitute a piece of cat-gut for the stylet. This is introduced into the canula as far as the beaded extremity, beyond which it ought not to protrude. A mark is made with ink upon the cat-gut, just on the outside of the ex-

ternal orifice of the canula, to the extent that the tent is designed to pass beyond the obstacle.

The canula thus armed, is again to be introduced into the eustachian tube as far as where the obstruction existed. The cat-gut being then pushed forward as far as it is marked, the canula is withdrawn and the tent left. In leaving the cat-gut in its place, it is necessary to hold it firmly at the distance of an inch from the external orifice of the canula, while the latter instrument is withdrawn, by repeating inversely the manipulations by which it was introduced. When the instrument has been passed along that part of the cat-gut which is between the fingers and the opening of the canula, the retraction of it is to be stopped, the fingers which grasp the cat-gut must be removed, that the instrument may pass along another portion of it, care being always taken to hold securely the piece of cat-gut. The instrument being removed from the nasal meatus, the tent should be cut off near the nose, and fixed in its place by gently stuffing the nostril with cotton or lint.

This operation, complicated in description, is much more simple and easy in execution.*

* The process which the ingenious Ducamp has employed in the treatment of strictures of the urethra, would here be very useful. The employment of caustic is less to be feared, in this case, than that of a sharp instrument.

It acts, it is true, in a slower manner, but much more certainly. A canula armed with a trochar, introduced thus deeply, may take a wrong direction, inflict injury upon nerves and thus give rise to alarming symptoms, wound the branch of an artery, and give rise to a hemorrhage which might defeat the success of the operation. Besides, the other method is less painful, and in performing it, it is unnecessary to introduce the tent of cat-gut, designed to prevent the closing of the lips of the wound, a mode of dressing difficult for the surgeon as well as distressing and troublesome to the patient.

As in this case there is no stricture to be overcome, but only an imperforate state of the eustachian tube to be remedied, it is necessary to modify

The method which I recommend has the advantage of restoring the function of the organ, without inflicting any injury upon it. It is practicable whenever there is a cul-de-sac in the porch of the tube, although not more than a line in depth, but it cannot be employed when the orifice of the tube is closed even with the margin of the original opening, because then it is impossible to fix the instrument, or to ascertain accurately the place where it ought to penetrate.

This method is equally impracticable when the tube is obliterated throughout its whole extent. It is to be presumed that such is the extent of the obliteration when, after passing the stylet four or five lines, the same resistance continues to be felt.

The operation which I have just described, I tried in July, 1813, on the person of M. D. of A., of whom I spoke in sec. ii. chap. 2d.

After having taken into account the circumstances which had preceded and followed the deafness, I examined, though not very carefully, the external auditory passages. As there were numerous little hairs dispersed over the part, which prevented my seeing the bottom of the passage, I carried my investigations externally no further.

I then directed my attention to the eustachian tubes. By exploring these parts, I discovered that the left tube was closed even with the orifice of the cartilage, so that it was impossible to fix the sound, or to determine the precise point into which

the instrument in some respects. Instead of placing the caustic in the sides of the fossæ in the metallic portion, as in the instrument of Ducamp, it is necessary to have a socket hollowed out in the extremity for the nitrate of silver, which should here be employed, not for the purpose of removing a lateral stricture, but rather for restoring a channel which has been completely obstructed.

the trochar ought to be plunged. I therefore discontinued all further attempts upon that side.

On the right side, however, the opening of the tube prevented an excavation, or cup, about a line in depth. The sound entered the fossa and was easily fixed there.

After this discovery I had no longer any doubt in regard to the cause of the deafness. Consequently I determined to perform, on the right eustachian tube, the operation which I have described. I plunged the stylet to the depth of four lines, without perceiving that it passed the obstacle. I withdrew the stylet and inserted a piece of cat-gut. The next day I made a second attempt, passing the stylet two lines deeper, but without any success. Nevertheless the operation was not painful or followed by any unpleasant symptom.

This attempt, wholly ineffectual as it was, will not, I trust, be useless to our science. It establishes: 1st, the practicability of the operation which I have described; 2d, that it is but little painful; 3d, that we may penetrate with the instrument in the direction of the closed eustachian tube, to the extent of six or eight lines, without fear of any dangerous occurrence.

Despairing of being able to restore hearing by this process, I took into consideration Mr. Cooper's operation. In order to ascertain the condition of the membrane, I introduced a blunt stylet into the external meatus. The depth to which the instrument entered, and the sound produced by its striking the part with which it came in contact, convinced me that I had entered the cavity of the tympanum, and that the membrana tympani was destroyed. The left ear was in the same state.

I believe that I am the first individual who has described or practised the operation of which I have just spoken. Before attempting it I had made many experiments upon the dead body in the following manner: After having first pierced the membrana tympani, I inserted in the eustachian tube a little cone

of wax, excavated and open at the top. The base was closed and turned toward the internal opening of the eustachian tube. Necessarily, then, the cone would mould itself to the tube and it would be so deeply buried as to make, at the internal opening, a cul-de-sac, a line and a half in depth. The body being conveniently placed I perfomed the operation described above. The absence of resistance indicated to me that I had entered the cavity of the cone. To assure myself more positively, after I had withdrawn the canula, I removed the stylet, and again introduced the canula by the nose. This having entered into the cup, I threw in an injection which issued by the external meatus.

CHAPTER II.

On catarrh of the eustachian tube.

This disease is of the same character as that which affects the cavity of the tympanum and mastoid cells. It is rare, when the latter parts are affected with the catarrhal inflammation, that the eustachian tube and its expansion are not concerned.

The causes and the symptoms being the same as those of catarrh of the tympanum and cells, the treatment should also be similar; we therefore refer to chap. 1st. sec. ii.

CHAPTER III.

On obstructions of the eustachian tube.

This passage may be filled with blood, with mucus, or with a substance resembling chalk. Among the causes which produce obstruction of the expansion and canal of the tube, I enu-

merate the swelling of the pituitary membrane which lines these cavities, provided, nevertheless, that the sides of those parts be not adherent, for then there exists not a mere obstruction, but a complete obliteration, which it is important not to confound with the former.

1st. *On mucous obstructions.*—Guyot,* maitre des postes de Versailles, was seized with deafness caused by mucus which obstructed the eustachian tube.

Herhaldt, surgeon in Copenhagen, was convinced by anatomical investigations made upon dead-born animals, that the eustachian tube, when the fœtus is still contained in the uterus, is filled with the liquor amnii and with mucus, "so that (as say the editors of the Bibliotheque Germanique,) there is established an equilibrium between the exterior fluids and those within, without which the membrana tympani would suffer a violent compression from the water in which the fœtus floats."†

Whatsoever may be the rationale of the translators, the observation of Herhaldt is important, and it throws light upon a cause of congenital deafness which is much more frequent than is supposed.

However, Herhaldt is not the first who developed this fact. It is now more than thirty-three years since I heard the celebrated Dessault, in his lectures on Anatomy, remark that the fœtus in utero had the cavities of the mouth, œsophagas, stomach and intestines, larynx, trachea arteria, the nostrils, the eustachian tube and the external auditory conduits filled with the *liquor amnii.* That great man did not merely assert the fact; he demonstrated it, when he treated of the anatomical peculiarities of the fœtus before it had breathed.

Jonathan Wathen, surgeon, of the city of London, found

* Mem. de l'Acad. Royale des Sciences, ann. 1724.

† Bibliotheque Germanique, t. 1, p. 327.

in the body of a man, who had been rendered deaf by cold, the eustachian tube obstructed by concrete mucus.* The authors of the Leipsick Commentaries report the fact in the following words: *Repererat autor in cadavere viri quem frigus auditu privaverat, tubam eustachianam congelati muci plenam.*†

Tinka reports the same fact in a manner somewhat different, more at length, and with more appearance of correctness. The following is his account of it. *Wathen refert historiam viri* XXXV *annorum utraque surdi, cui rei occasionem refrigeratio corporis dedit, nec varia per plures annos adhibita malum tollere quiverunt, donec tandem homo ex variolis decessit. A morte nihil uspiam in organis est repertum, præterquam in solis tubis, quas mucus densatus ex toto opplebat.* (*Historia cophosis; Vindobonæ*, 1778.)

2d. A substance resembling chalk sometimes obstructs the eustachian tube, as well as the cavity of the tympanum and the mastoid cells. Arnemann has seen an instance of it which I have cited. My own practice also furnishes an instance of it in the person of Berthon D. of whom I spoke in the second chapter of the second section.

3d. Hemorrhage from blows, or falls on the head may produce an extravasation of blood in the internal ear, which coagulating may obstruct the eustachian tube, the cavity of the tympanum, and the mastoid cells. Such is the opinion of Stenon and Morgagni. Cooper relates an instance of it accompanied with particulars which leave no doubt in regard to the existence of such a cause of deafness.

4th. The tumefaction of the pituitary membrane which lines the orifice of the tube and also the interior of that

* Undoubtedly the subject of this case died soon after having suffered the chill.

† Comment. Lepsiæ anno., 1749.

canal, caused by frequent and protracted defluxions, gives rise to a transient deafness which often becomes permanent in infants of an early age. This cause of deafness is in young subjects more common than is generally believed. The following case proves that persons of a more advanced age may be the subjects of this affection, which may produce in them a greater or less degree of deafness, together with a disagreeable swelling of the parts.

An indurated swelling of the tube, which may be produced by a venereal taint, or other cause, may produce the same result.

Diemerbroeck, for the purpose of ascertaining the existence of obstruction or obliteration of the eustachian tube, proposes the following means: "When, after having accurately closed the two ears, a bow is taken between the teeth, and then drawn across the strings of a violin, without any sound being heard, the eustachian tubes" says he "are obstructed."

This is also the opinion of Haller. "Another route," says that distinguished physiologist, "by which the sonorous vibrations of the air may reach the organ of hearing is that of the eustachian tube. Indeed, it appears that in cold-blooded animals it is the principal avenue of sound."*

It is possible that such may be the fact in the latter class of animals; but in man, both experiment and observation tend to disprove such a function of the eustachian tubes, as well as to reject, as symptoms of their obstruction or imperforation, the results of the experiment directed by Diemerbroeck, and those of the watch held between the incisor teeth; for in both these experiments, if the patient hears, it is a proof that the auditory nerves are in a healthy state, and not that the tube is

*Dictionnaires des Sciences, t. xxix, in 4 to. p. 175.

unobstructed. The following facts substantiate that which I have advanced.

An individual, fifty-nine years of age, had the eustachian tube and the cavity of the tympanum perfectly free, a circumstance which I ascertained by the following experiments:— First closing his mouth and nose, and then making a strong expiration, he perceived the air to pass into the internal ear, and to strike upon the membrana tympani. He experienced the same sensation when he blew the nose. I injected the tubes and the liquor penetrated to the mastoid cells. These experiments clearly proved that the eustachian tubes were free; nevertheless, he could not hear the beating of a watch when he held it between the teeth. Besides, M. Perole has made experiments which prove, to demonstration, that the eustachian tube does not serve for the propagation of sounds. I have quoted them in a note under the second chapter of section ii.*

*When after the external meatus is closed as accurately as possible, we place between the teeth a solid conductor, in contact with a sonorous body which is vibrating, we then perceive the sound to be slightly modified. This experiment would seem to indicate that, in this case, the eustachian tube transmits some of the sonorous undulations to the ear. We can, however, give a reason for this phenomenon without recurring to that explanation. Sounds may influence us in two ways, 1st, by the vibration of sonorous bodies; 2d, by the undulatory motion which the vibrating body communicates to the air. This being established, it is obvious that the teeth, or any other osseous part, in direct communication with the auditory apparatus, may, when in contact with a vibrating body, communicate the motion even to the interior of the ear and produce the perception of sound. But the sonorous undulations communicated to the air by the same body, cannot be perceived by the ear, but through the external auditory meatus, the eustachian tube appearing to have no other use but that of renewing the air in the cavity of the tympanum.

We may presume then, that the person of whom Saissy speaks, who could not hear the beating of a watch placed between the teeth, had some

Diemerbroeck gives also, as a sign of obstruction of the eustachian tube, the buzzing noise and ringing of the ears. The buzzing is not a symptom of obstruction of the tubes. The individual whom I have just mentioned experienced a good deal of ringing and buzzing of the ears, although these passages were perfectly free. I could cite many facts analogous to this.

Cooper, in relation to this point entertains an opinion counter to that of Diemerbroeck: "When the defect of hearing," says Cooper, "is owing to an obstruction of the tube, there is none of that roaring sound in the head which accompanies nervous deafness."* I am in possession of facts which prove the contrary.

Lentin, for the purpose of ascertaining whether the eustachian tube was closed, proposed the following experiment: He laid the head upon a table, in such a manner that the affected ear was uppermost, and in a horizontal attitude. He then filled it with warm water and waited a short time to ascertain whether the tympanum was perforated or not. If it were so, the liquid would pass through the hole and enter the throat. He also directed the patient to close the mouth and nose, and to force outward the air which he had inhaled. If the tympanum were perforated, bubbles of air would escape to the surface of the water. On the other hand if the membrana were entire, the air introduced into the tube would cause a protusion of the membrana tympani toward the external auditory meatus, and cause as much water to flow from the cavity of the ear as would be displaced by the convexity

deep-seated defect of the organ of hearing, perhaps even a complete destruction of the small bones, or the nerves concurring to form the auditory apparatus. Th. P.

* Bibliothique Germanique, t. viii, p. 408.

of the membrane. This circumstance proves that the tube is free in its whole extent. If it be obstructed, the water will preserve its level, will none of it flow out, and no bubbles of air will escape.

The reasoning which Lentin employs in the latter case does not appear to me to be so conclusive as the author seems to regard it. If we suppose, with him, that the membrana tympani is entire, the tube clear, and that after a strong expiration, a part of the water contained in the auditory meatus escapes, how shall we be assured whether the water escapes in consequence of the impulse of the air upon the membrana tympani, or of the involuntary motion of the head caused by a violent expiration. The same objection, in all its force, obtains against the second part of the conclusion.

The symptoms which I have described, in the chapter which treats of closure and obliteration of the eustachian tube, belong also to obstructions of this passage, whatsoever may be the nature of the substance with which they are filled. But besides these signs there are characteristic criteria which indicate the particular kind of matter which obstructs the tube;* for instance:

If the individual becomes deaf after having experienced frequent defluxions, and protracted catarrhs, we shall be authorised to believe that the deafness is produced by an accumulation of mucous matter in the cavities of the eustachian tube and its expanded orifice.

If deafness comes on gradually, in consequence of syphilis, or any other disease, without any affection of the fauces or nares—the defect of hearing remaining although the disease which gave rise to it may have been cured, it is then to be

*This is also applicable to the cavity of the tympanum and to the mastoid cells.

presumed that the deafness proceeds from a chalky substance obstructing the tube.*

This presumption will become perfect conviction, if, by the aid of a canula, a blunt probe be conveyed into the eustachian tube. The resistance which the extremity of the instrument will encounter, and the absence of all pain during the examination, will indicate the nature of the obstructing substance. Finally, if, on injecting the canal, the liquid does not penetrate into the cavity of the tympanum, and if, at the same time, small chalky particles are attached, which the patient discharges by the mouth and nose—all these circumstances combined must remove all doubt in regard to the immediate cause of the deafness.

If, after a cold, or catarrh of the throat and nasal fossæ, deafness persists or follows, and a difficulty is experienced in probing the tube, we may be assured that the pituitary membrane, which lines the porch of the tube, has become swollen.

None of the several species of obstruction, the traits of which we have given, will be found to resist the treatment which we are about to recommend.†

Treatment.—We shall here direct our attention only to the obstruction of the eustachian tube. We shall suppose, as we have done in other instances, that the disease which may have produced the obstruction no longer exists, and that there merely remains the local disease.

Many modes of removing obstructions from the eustachian tube have been devised, such as, 1st. Injections thrown into

*Syphilis often producing difficult hearing and even complete deafness without the concurrence of any of those causes of which I have spoken. I shall cite instances of it in the course of this work.

†We, nevertheless, except the engorgement of the pituitary membrane which must be combatted with repeated purgatives, blisters, and even a seton in the neck.

the canal, by instruments introduced through the mouth; 2d, by instruments conveyed through the nose; 3d, by introducing into the canal, by a forced expiration, some detergent liquid with which, for that purpose, the mouth and nose have been filled; 4th, clearing away the mucous matters which accumulate in the orifice of the tube and about it; finally, the operation of perforating the mastoid apophysis has been proposed and performed, to the consideration of this, however, it is not necessary for us to recur.

I shall not, in this place, rigidly pursue the chronological order in which these different methods have been proposed, or practised. I shall describe last in order, that to which I give the preference.

1st. *Of the method of injecting the eustachian tube through the mouth.*—This method was first recommended early in the last century, and was devised by Guyot *maitre des postes* of Versailles. The celebrated Sabatier states that Guyot had acquired a knowledge of anatomy from motives of mere curiosity. His own misfortune induced him to study particularly the structure of the ear. After having conceived the idea of curing himself by injections thrown into the eustachian tube, he undertook to construct an instrument suited to this end, and by the use of which he recovered the faculty of hearing.*

In 1724, Guyot presented the syringe which he had invented to the Royal Academy of Sciences. This instrument is a double pump with a common reservoir, moved by two handles, situated on opposite sides, and worked by a row of teeth attached to a cog-wheel. From the middle of the reservoir there issues a leather tube, to which there is adapted another tube of pewter which is curved. "The essential part

*Heister, Institutions de Chirurg. t. v. p. 267

of this apparatus," say the committee of the Academy, "is a curved tube, which is passed deep into the mouth, behind and above the veil of the palate, in order to apply it to the canal of communication which is to be injected. There is yet wanting an instrument for injecting the canal by this route. That of M. Guyot appears to us to be very ingenious, and may serve to wash the mouth of the eustachian tube, which will render it very useful in certain cases."*

It appears from this report, that the committee of the Academy did not believe in the possibility of injecting a liquid into the interior of the ear, by passing an instrument through the mouth into the eustachian tube, and especially such an instrument as that described above, since they say that "it may serve at least to wash the orifice of the canal called the eustachian tube."

For myself, I think that this was the utmost utility of the instrument. Indeed, to be convinced how difficult it would be to enter the orifice of the tube with a canula of pewter, and how much more difficult still to fix it in the canal it is sufficient to examine without prejudice the instrument of Guyot, and to observe that the orifice of the eustachian tube is directed forward, and that this direction renders it very difficult, if not impossible, to introduce a sound into it by conveying the instrument through the mouth.

Besides these inconveniences, there are others necessarily attendant upon the method of Guyot; these are nausea and vomiting, excited by the irritation inflicted by the instrument on the fauces and the veil of the palate.

Notwithstanding all the inconveniences which embarrass this method, its author merits our respectful remembrance. The praise which the Royal Academy, and the most distin-

* Mem. de l'Acad. Royale des Sciences, annèe 1724.

guished members of our profession, bestowed upon his invention, were justly merited.

Sauvages speaks of the method of Guyot, but in such a manner as to induce us to believe that he had not a correct knowledge of the instrument or the mode of using it. The following is his account of it: "This instrument is made with a tube of lead fitly curved, which is introduced into the nose,* and by this means dicutient medicines are conveyed through the tube and into the ear. Dropsy of the organ is thus cured.†"

Sabatier thought that further enquiry ought to be made to ascertain whether injections might really bc thrown into the tube, or whether, as the committee of the Academy remark, their use is limited to merely washing the expanded orifice. Thc translator of Heister's Institutes of Surgery says, in relation to this subject: "The difficulty of finding the orifice of the eustachian tube, in order to fit to it the tube of the syringe, gave rise to this suggestion. It would even appear that when the orifice is found, the liquid could not well bc made to enter, because of the resistance of the air enclosed in the cavity of the internal ear."‡

The air contained in the tube, in the cavity of the tympanum and the mastoid cells presents no obstacle to the entrance of the injected fluid. The specific gravity of the latter, the force with which it is injected, however slight that force may be, are sufficient to expel the air which makes its way between the walls of the tube and the sound. I every day pass into the ear warm injections, sometimes of mineral water, sometimes of pure water, or other liquid which I deem

* We know that Guyot introduced the tube by the mouth.

† Nosologie, t. ii, p. 219.

‡ Heister, Constitutions de Chirurg. t. v. p. 268.

proper, and always with very little effort. The air of the cavity has never opposed the slightest obstacle.

The editors of the *Journal de Medecine de Paris* remark, that "although Bell and other surgeons consider it impossible to reach the eustachian tube, through the mouth, we nevertheless observe, in the fifth volume of the Memoirs of Rotterdam, that Hoaf has accomplished it. He depressed the tongue, whilst the veil of the palate was strongly drawn upward by means of a strong expiration. He then introduced into the mouth a tube, slightly curved and adapted to a small syringe, which he directed upwards towards the tube. Nevertheless, it is possible," add the editors, "that the injection did not penetrate, but merely washed away the mucous matters from without.*

It is obvious from all that we have said, that this method is impracticable, or at least very uncertain, both (we again remark) on account of the nausea and vomiting that it excites, and the almost insurmountable difficulty of entering the orifice of the tube, or fixing the instrument when its introduction has been accomplished. These numerous difficulties have caused even those who have judged most favourably, in regard to this method, to doubt whether, by these means, we can succeed in conveying liquids into the interior of the ear. All agree in believing that the injections merely wash the orifice of the eustachian tube.

2d. In the collection of Theses on surgery published by Haller there is found one, read in Paris in 1748, the subject of which is another method of throwing injections into the cavity of the tympanum. This mode of injecting, if it may be called such, consists in filling the nose and mouth of the patient with a great quantity of the vapour of water contain-

* Journal de Médecine, fev. 1793.

ing honey, or some other detergent liquid, and causing the patient to force it into the tubes by making a forced expiration, the nose and mouth being closed. The imperfection and insufficiency of this method are obvious to all; I will therefore dwell upon it no longer.

3d. Lentin published in 1793, a small work in latin entitled, *Tentamen vitiis auditûs medendi*, inserted in the second volume of the commentaries of the Society of Gottingen. He there gives a complete description of a method of cleansing the orifice of the custachian tube of the accumulated tenacious mucus which may obstruct it. For this purpose he devised a canula armed at one of its extremities with a sponge, and of a shape suited to the object. The intention of the author was to introduce the sponge behind the veil of the palate, without touching it, (a thing impossible) as far as the orifice of the tube and to press it at intervals from above downward, upon the margin of the orifice; the sponge to be previously wet with soap and water, or some aromatic wine. By these means he deemed it possible to remove the mucus.

For the sponge, M. Lentin substituted a small piece of veal, and as he says completely succeeded without encountering any thing disagreeable, that is without causing pain and inflammation by the roughness of the sponge.

This method is attended with all the inconveniences of that of Guyot without possessing its advantages. The latter washes at least the orifice of the tube and its vicinity; that of M. Lentin, according to his own acknowledgement, irritates the parts very much when the sponge is inserted, and the piece of veal which is substituted for it glides over the mucus without removing it.*

* The improvement which M. Lentin made upon his method is to be found in the second volume of his *Additions á la Médecine pratique*. In this work M. L. recommends to make injections into the external auditory

4th. A method which shall be unattended with both the inconveniences and dangers of the operation of perforating the mastoid apophysis, those which result from the puncture of the membrana tympani, and the imperfections, difficulties and uncertainty, which the methods of Guyot and Lentin present, will undoubtedly merit preference over all these. That method consists in injecting the eustachian tubes through

meatus in the following manner:—The patients head is to be placed upon a table, in such a manner as to lie upon the ear which is not to be injected. That which is to be injected is then filled with the proper liquid, and after having introduced the point of a syringe beneath the surface of the liquid, the piston is to be pushed with more or less force. M. Lentin assures us that the undulations caused by this manipulation, produce effects superior to those of the ordinary mode of injecting.

The liquid which he most commonly employs is composed of three ounces of the infusion of mercurialis or saponaria, a drachm of the gall of a calf, and from five to twenty drops of lac ammoniac.

"A cure has been accomplished by these means" (say the editors of the Journal generale de mèdecine) "of a cure of deafness which resulted from a suppuration in the interior of the ear, (without doubt of the external auditory meatus.) The injections removed much membranous matter, and hearing having been restored the cure was completed by means of the infusion of scordium, with, or without the addition of the oil of myrrh."

This method of injecting the external ear does not appear to me so superior to the ordinary mode as M. Lentin supposes. It appears that this author ascribes great influence to the undulation produced by the pressure of the syringe upon the water contained in the external auditory meatus. He thinks that by this undulation the scabs and sloughs are more easily and more certainly detached. It may or may not be so; but there is one advantage which I discover in this method of washing the external meatus, of which M. Lentin does not speak. It is the breaking of the stream of liquid which issues from the pipe of the syringe and hence avoiding the pain, sometimes very acute, which the injection thrown upon the naked surface produces in case of ulceration with intense inflammation. By the means proposed by M. Lentin, we avoid all concussion, and painful impulse, a thing which is impossible, in the ordinary method, whatever precaution may be taken.

the nares. I grant that this idea is not new but the instruments which render this operation altogether easy and safe are of a new invention and, in that respect, merit the attention of the profession.

Before I describe the mode of executing this operation, and the instruments which are to be used in performing it, I shall give a brief historical account of both.

Douglas, an English physician, (says Sabatier,) first pointed out, in his anatomical works, the method of injecting the eustachian tube from the nares.

Cleland, a London surgeon, recommended, in the philosophical transactions of 1731, a syringe made in the form of a flexible catheter, to be introduced into the nose and thence into the eustachian tube.

Sauvages* states that the surgeons of Montpelier use the same instrument, but it is impossible to form an idea of it from the description given by him.

Jonathan Wathen, another English surgeon, is said to have injected the eustachian tube through the nose. The authors of the Leipsick Commentaries speak of the instrument of Wathen, and of the manner in which it is used in the following terms:—*Utitur autem fistula argentea, commune specillum longitudine non superante, apice, paululum incurvato instructa, et eburneæ syringæ, tepida aqua rosarum mellita impletæ aptata. Hanc inter alam et septum nasi hoc modo ingerit, ut ejus convexa pars superiorem partem aperturæ narium respiciat, eamque usque ad orificium ellipticum protradit; tunc illa pars septo obvertitur, ut incurvatus apex tubam facile intrare possit; quo facto aqua in eam impellitur, quæ mucum per nasum aut os, aut per utramque cavitatem eluit. Memorat aliquot surdos hac ratione sanatos operandique methodum icone declarat.*†

* Nosologie, t. ii.

† Commentar, Leipsiæ, anno. 1749, t. viii, p. 147.

This account, both of the instrument and the operation, is too concise to serve as a sufficient guide to the profession.

The distinguished professor Sabatier, also invented an instrument for the purpose of injecting the eustachian tube through the nose. The instrument is four inches long and a line in diameter. The extremity, to the extent of six lines, is bent so as to form an angle of 130°. The other extremity of the tube has a nut for the purpose of attaching it to a syringe. A small projection which is fitted to the other extremity of the tube serves to show, with precision, what the position of the instrument is when introduced into the nose.

It is evident from this description that the shaft of the instrument of Sabatier is straight, with a short curvature at the extremity, and that he had but one for sounding both tubes. It appears to me that it would be difficult to enter the tube with such an instrument, even upon the dead body, and, on the living subject, impossible. Sabatier himself, also remarks, "that which is not difficult in an anatomical preparation may be absolutely impossible on a living man."*

Leschevin proposes to inject the eustachian tube through the nose. "There is but one way," he says, "to convey remedies directly into the cavity of the tympanum, and that is by injecting through the eustachian tube. The large orifice of this passage, at the bottom of the nares, will, without much difficulty, permit the introduction of the instrument. I have often performed this operation upon dead subjects of different ages. After a few attempts I found no more difficulty than in probing the lachrymal canal from the nose. I have used, in these attempts, a curved blow-pipe, which I introduced through the nose."†

* Heister, Institutions de Chirurg. t. v. pp. 267 et 268.

† Prix de l'Acad. Royale de Chirurg. t. iv. in 4to.

M. Leschevin gives no description of his instrument—he merely says that it is a curved tube; but has it one or more curvatures? This the author does not state. Besides, he appears to have confined his attempts to the dead body alone.

Bell entertains a very different opinion in regard to this operation. "It has been proposed," he says, "in case of obstruction, to open the passage (eustachian tube) with the blunt extremity of a curved probe, or even by injecting with a syringe a little milk-and-water or any other bland fluid. But although those who have a perfect knowledge of the structure of these parts may, after a good deal of experience, perform this operation very easily on the dead subject, there is no ground to hope that any advantage would be derived from it in practice; for the irritation which is exited in those parts, even in a state of health, by the extremity of a probe or syringe is so great, that all attempts to introduce them must be very uncertain, and the difficulty must be greatly increased when the orifice of the tube is obstructed by disease."*

Bell is not the only one opposed to the method of probing the eustachian tube through the nares. Other distinguished individuals have entertained, and perhaps still entertain, his opinion.

M. Portal, in his Summary of Practical Surgery, says: "Some have thought it possible to inject the eustachian tube, by passing the instrument through the mouth. Wathen was the first who described the operation.† His remarks may be seen in the Philosophical Transactions of the year 1734. Certain French surgeons have endeavoured to perfect the discovery; many have believed that they had succeeded; but un-

* Bell, Cours complet de Chirurg. t. iv. p. 203.

† Wathen passed the instrument into the eustachian tube through the nose.

fortunately their success has not corresponded to their anticipations and I regard their attempts as useless." "It is not possible," he adds, "to inject the eustachian tube, either by the way of the mouth, or the nose."*

Dr. Trucy, of Marseilles, in his inaugural thesis defended before the School of Medicine in Paris, on the advantages of perforating the membrana tympani, in case of deafness caused by obstruction of the eustachian tube, after having briefly mentioned the several means which have been employed for the purpose of conveying liquids into that passage, and thence into the interior of the ear, thus expresses himself: "Injections into the eustachian tube are then but equivocal means from which we cannot reasonably expect any success."†

This want of success is owing rather to the imperfections of the instruments which are still employed, than to the peculiar conformation and sensibility of the parts through which they are designed to pass. Nevertheless, it is to these circumstances that all the inconveniences of the operation are attributed by those who have rejected it as a process difficult or even impracticable.

I am persuaded that, by means of the instrument represented in the engraving at the end of the work, this operation will hereafter be performed with celerity, ease, precision, and without pain.

Description.—The instruments alluded to is a tube curved in the form of an irregular italic *s*. The extremity which is to enter the tube is obtusely pointed, and the other has an orifice which receives the beak of the syringe; on the side of this orifice there is a small projecting plate.

The tubes are four inches long, a line and a quarter in diam-

* Chirurg. pratique, t. ii. p. 481.

† Consid. surla perfor. de la memb. dis. tympan. Paris, 1803.

eter, and have three curvatures, of which the first is three and a half lines deep, and begins at the rounded extremity. This curvature is in the same plane with the projecting plate. The second curvature is three lines deep, and is directed downward and to the left, in the instrument which is employed on the right side, and to the right in that of the left. The third curvature is a line and a quarter deep and is turned to the right, in the instrument of the left side, and vice versa.

The tubes which I have just described are of dimensions suited to adults and to persons of fifteen or sixteen years. It is necessary to employ smaller instruments for children.

Mode of using the instruments.—The patient should be placed in an easy-chair the head slightly thrown backward. The operator, standing before the patient, and holding the instrument by the external extremity like a pen, with the right hand when he is about to pass it into the left tube, the left hand or only the little finger resting gently upon the forehead of the patient; he then conveys the tube horizontally into the nose, the point being directed downwards. As soon as the first curvature has entered, the handle is to be depressed, while the instrument is passed onward with careful management. When the second curvature has completely entered, the rounded extremity of the canula is near the orifice of the eustachian tube. He must then execute a movement of rotation inward, with the handle, raising this part a little, and at the same time applying the third curvature to the septum of the nose.

The left eustachian tube should be sounded with the left hand, the same manipulations being performed which are directed to be executed on the right.

We are sure of having entered the tube when the projecting plate, at the external extremity, is directed vertically upward, when the instrument appears firmly fixed, and when the

injected liquid returns in part by the orifice of the instrument, or appears to issue from it.

In removing the instrument, the operator should gently draw it toward himself and repeat, inversely, the motions which were employed in introducing it.

Persons upon whom the operation is performed for the first time experience merely a painful itching, occasional sneezing and a slight weeping; but as soon as the parts become accustomed to the instrument, there is no longer any unpleasant sensation.

The advantages of this method cannot reasonably be disputed. By means of it we are enabled: 1st, to convey medicated liquids into the eustachian tube, the cavity of the tympanum and the mastoid cells, and thus to accomplish the cure of deep chronic ulcers, with which these parts are often affected.

2d. To remove from these regions mucous obstructions, which may have lodged there in consequence of defluxions and catarrhs.

3d. To evacuate blood which may have accumulated and coagulated there in consequence of a blow or fall upon the head.

4th. To dissolve and remove chalky substances, which sometimes accumulate in the same cavities.

5th. By means of the canula which we have described we may introduce a stylet, in the form of a trochar, into the cavity of the eustachian tube, pierce a congenital membranous septum, or a cicatrix formed in consequence of ulcers of the throat and fauces.

6th. Finally, by the same means, if there is any insensibility of the acoustic nerve, we may introduce lavements into the interior of the ear.

Those who advocate the perforation of the mastoid apophysis make the following objection to the method of injecting the

ear, through the eustachian tube, and by a singular inconsistency they at once remove it, and refute themselves.

"This method" they say "is not sufficient to remove the cause of deafness, since an injection made in this manner forces deeper the substance which causes the obstruction in the cavity of the tympanum. It issues, indeed, with the injected fluid, but it is not thrown out with the same force as when the injection is thrown in through the mastoid apophysis."*

These, I am persuaded, will be regarged as very feeble reasons for giving preference to an operation so painful, and attended with so great danger, over another not in the least painful nor accompanied with the slightest hazard.

I believe that I have established in the most satisfactory manner, the comparative advantages of injecting the eustachian tube, by the way of the nasal passages, and the utility of the newly-invented instruments, by which the operation is accomplished. I shall now point out the cases in which this method is impracticable—also those in which it would be unavailing. They are:

1st. Mal-conformation of the nasal passages.

2d. A polypus located in these cavities.

3d. A tumid state of the pituitary membrane lining the orifice of the tube and its vicinity.

These causes may present obstacles to the introduction of the tube into the orifice of the canal.

When the cause of deafness depends upon induration or ossification of the membrana tympani, or on the lesion of some part of the labyrinth, the operation of which I speak will be attended with no favourable result.

* Journal de Med. Chirurg. Pharm fev. 1793.

SECTION IV.

On diseases which affect parts in the vicinity of the eustachian tube, and which thus give rise to deafness, and sometimes to dangerous diseases of the internal ear.

We have just treated of those diseases which directly attack the eustachian tube. We will now glance at those which affect parts in its vicinity, and which from swelling or preternatural growth, compress the tube in such a manner as not only to create deafness, but also to produce other diseases of the internal ear. These diseases are, inflammatory swellings; abscess of the tonsils and of the half-arches of the palate; polypous excrescences in the posterior nares; and exostoses of the internal plate of the pterygoid apophysis.

CHAPTER I.

On inflammatory engorgements and abcesses of the tonsils, and of the half-arches of the velum palati.

Abscess of the tonsils and of the half-arches of the palate, and the inflammatory swelling which precede them, are the result of cynanche tonsillaris.

The causes, symptoms, and treatment being described in many medical works, it would be departing from our particular province to dwell upon them here.

We will nevertheless advert to these diseases so far as they may relate to the organ and function of hearing. Indeed, when an inflammatory swelling attacks chiefly the posterior palate

half-arch, it may be propagated to the eustachian tube, compress that canal, and give rise to an inflammation which may occasion deafness. When the abscess spontaneously bursts, the pus may make its way through the walls of the tube, or be poured into the interior of the ear, and there produce alarming results.

It is important, therefore, carefully to distinguish the case in which abscess of the posterior half-arch presses upon the eustachian tube. The difficulty of hearing, buzzing noises, and often an acute pain which shoots through the internal ear, are the symptoms by which we ascertain that the abscess is very near the eustachian tube. On touching the tumour with the finger, a fluctuation more or less manifest will indicate the propriety of either hastening or postponing the opening of the abscess; nevertheless, we ought to perform the puncturing of it as soon as possible.

The abscess should be opened at the most depending part. The mode of opening it, and the instruments which are employed, are described in numerous works on operative surgery.

I shall finish this chapter with a few instances of this form of abscess, chiefly derived from the posthumous works of our countryman Jean Louis Petit.

That author, after having spoken of abscesses seated in parts around the ear, remarks: "But there are others, far more destructive, which attack the internal ear, perforate the membrana tympani, convert the cavity of the tympanum into an abscess, and destroy the attachments of the muscles of the malleus, of the stapes and the incus. I believe, however, that pus is not previously formed in that cavity; but that which is deposited on the outside of it makes its way there, either through the eustachian tube, the meatus externus, or both together. In the latter case the pus escapes both by the external ear and by the

mouth, but not till it has produced alarming symptoms, chills, and paroxysms of fever" ********. "From what I have stated above it will be manifest," continues this celebrated author, "that the abscesses of which I speak, having a double issue, should be least mischievous, which, however, is not the fact; because in this case the matter lingers in the osseous cavities, the walls of which cannot collapse. Because it cannot be expelled by compression, it remains and produces caries of the bones. This caries cannot be treated with any topical means; it is even inaccessible to any salutary operation, and there is nothing but injections* from which any advantage can be derived. Exfoliation, which is the most favourable result that can be looked for in the treatment of caries in other parts of the body, is ineffectual here, because of the difficulty of removing the exfoliating portions. They become in many ways productive of mischief, as will be seen in the following cases."†

The subject of the first case was a man of adult age. He had been ill for some time, and had been treated by many surgeons who had declared his case to be incurable.

After a careful examination, Petit ascertained that the membrana tympani was destroyed; that the surface of the tympanum was denuded of its pariosteum; that the small bones were detached, concealed in a recess of the cavity, and inaccessible to the probe, to which place Petit supposed them to have been conveyed by suppuration. One day, however, as he was injecting the ear, the incus and stapes escaped together. The orbiculare, stapes, and the long leg of the incus were anchylosed so that these three bones formed but one piece. Some

* Injections, such as we have described, made as soon as pus is deposited in the cavity of the tympanum and mastoid cells, will prevent the accidents of which this celebrated surgeon speaks.

† Petit, Œuvres posthumes, t. i.

days after the malleus issued, in consequence of an injection thrown in with more than ordinary force.*

"Sometimes," says our author, "pus escaped in great quantity. After some time I discovered that much more escaped than the cavity of the tympanum could contain, and that this cavity, of which the walls were bony, could not, of itself, furnish the whole; hence I inferred that the matter was derived from some other scource; and as there are but two ways by which pus can enter into the drum—the external meatus and the eustachian tube, and as externally there was no swelling, and no matter escaped on pressing upon that region, I doubted not that the pus entered the cavity of the tympanum from the eustachian tube. On passing my finger into the mouth and pressing the tonsil, pus passed from it into the cavity of the tympanum, from which it was made to issue by throwing in injections, which circumstance caused me to put a few questions to the patient. He then apprised me of a circumstance of which I had been ignorant, which was that before the ear became diseased, he had been subject to swellings of that tonsil, which were sometimes spontaneously resolved and sometimes terminated in suppuration, and to which he had not been subject since the suppuration of the ear. This circumstance, says Petit, induced me to believe that this abscess, having penetrated the eustachian tube, was the source of the pus which issued from the ear, and that if there were a sufficient quantity to make an opening towards the throat, so that injections made through the ear might issue at that opening, the ear might be very easily deterged. Indeed, sometime

* The injections which Petit employed, and which varied according to circumstances, were decoctions of barley or aristolochia; sometimes of guiacum or sassafras, with which he often blended the infusion of colewort, of vulnerary, plantain, house-leek, &c. &c.

after this, the left tonsil swelled again, formed an abscess and spontaneously opened behind the veil of the palate, so that the opening could not be seen. The patient spit up the pus and it also escaped by the ear. In order to avail myself of this advantage offered by nature, that is of the opening which was formed in the throat, I had a new syringe made, the beak of which terminated obtusely, so as to fill accurately the canal of the external ear, that the liquor injected might not regurgitate, but, being urged with some force, might make its way through the eustachian tube and escape by the mouth. This perfectly succeeded for five days, after which the injection passed with difficulty, and by degrees ceased to pass altogether, and the patient recovered."*

The same author reports another case, the subject of which was a child which had been afflicted with pain in the ear and with loss of hearing in the ear affected, (he does not say which.) After one year of suffering the patient was suddenly attacked with a chill, after which he had fever accompanied with delirium. He was bled in the foot, in the height of the attack, after which he fell asleep. Soon after, some one on seeing the ear covered with blood and matter, waked him; he had no longer any pain, and very soon the fever ceased.

Lavements of barley-water, to which there was added a little of the infusion of vulnerary, were employed in the latter stages of the disease. At the end of twenty-five days, the little bones of the ear, a bony portion of the external auditory meatus, and a fragment of the margin of the foraman ovale successively escaped. "These cases," says this distinguished author, "are always very tedious, and they do not in every instance terminate so fortunately."

The facts which I have adduced in the above extract are

* Ouvrage cité.

very interesting in two respects. In the first case we observe a severe disease having its primary seat in the posterior part of the left tonsil and in the external half-arch of the velum palati. This abscess, after opening and closing many times, makes its way through the walls of the eustachian tube; the pus is poured into the cavity of the tympanum, destroys the membrane which lines it, disorganises and detaches the small bones, and finally bursts through the membrana tympani.

This disease had continued twelve years. It was not till after another swelling of the tonsil of the same side, which formed an abscess that burst at the most depending part, behind the velum palate, and after the employment of detergent injections, that the source of the purulent secretion was dried up and the patient cured, but with loss of hearing in the left ear.

If Petit had had charge of this patient, at the commencement of the first swelling, I doubt not that he would have prevented the rupture of the abscess into the eustachian tube by cautiously incising the tonsil. By this operation, which is unattended with difficulty or danger, he would at once have prevented this protracted suffering of the patient, and have preserved a valuable organ.*

* The following case goes to prove the truth of this assertion:

"Rosalie C***," says Dr Percymond, "had been very subject to cynanche tonsillaris. For more than a year the enlargement of the right tonsil was accompanied with a ringing and a degree of deafness in the ear of that side. The patient had an attack of quinsy in December, 1809; the disease was preceded by chills, and some degree of delirium occurred after bleeding from the arm. The patient slept for some hours, and while sleeping, her cap and her ear were deluged with bloody pus, which issued from the right auditory meatus. The pain and delirium ceased, but a slight discharge still continued from the ear. Some time after this there occurred a new attack of quinsy, and the discharge from the meatus ceased. Notwithstanding the frequent repetition of detergent injections, the antiphlogistic means directed

This might have been accomplished, indeed, after the abscess had burst into the eustachian tube, by the injection of emollient and detergent liquids into the cavity of the tympanum. Had a cure not been affected, the pus might at least have been prevented from lingering in the interior of the ear and causing the mischief detailed above.

It appears that in this subject the eustachian tube became obliterated, or obstructed, near its internal orifice in consequence of inflammation. For had this canal been free, the pus would have issued, at least in part, by the mouth and nose, and the injections which were thrown into the external meatus would not have ceased to pass by the eustachian tube; whereas, after the cicatrisation of the accidental opening in the tube, the injections passed neither by the mouth nor the nose.

The disease in the second case was more profound; the seat of the abscess was, chiefly at least, in the internal ear itself. The unexpected discharge of pus from the external ear, the escape of the small bones in succession, and of fragments of the bony ring of the auditory meatus, and of the foramen ovale, after the employment of injections for five days, left no doubt in regard to this.

Hereafter such a state of things should be opposed by the

against the inflammations, did not prevent the right tonsil from becoming very large about the tenth day, and the occurrence of sordes upon the parts in its vicinity, with fetid exhalations from the mouth. The tongue being depressed by means of a spatula, and the jaws kept apart by the interposition of a piece of cork between the molar teeth, the abscess was opened with a pharyngatome. There issued from it pus and a quantity of black blood. The operation instantly assuaged the disease and the employment of detergent gargles completed the cure. From that time there was no more discharge from the meatus, pain, or difficulty of hearing in the right ear. The patient made habitual use of the prophylactic gargle of Quarin, composed of the infusion of sage leaves and red roses, together with the anodyne liquor of Hoffman."

seasonable employment of emollient injections through the eustachian tube. Under such circumstances the injections should be thrown in with much address, in order to avoid irritating parts already inflamed and painful in the extreme. After these injections, we should make use of those which are of a detergent quality, such as the water of Balaruc and Baréges, or rose-water with honey, &c.

CHAPTER II.

On catarrhal engorgement of the tonsils and palate half-arches, and the mucous deposits which cover and surround the internal expansion of the eustachian tube.

This affection always arises from catarrhal inflammation of the tonsils. The symptoms are a slight degree of pain, a little hoarseness and occasionally some difficulty of respiration and deglutition. The parts affected are of a pale red colour, and covered with a coating of mucus. The degree of deafness is in proportion to the magnitude of the swelling and to the quantity and tenacity of the mucus.

I have recently treated a young man, twenty years of age, whose case furnished an instance of deafness occasioned by chronic catarrhal engorgement of the tonsils, and by mucus which surrounded the orifice of the eustachian tube.

This case yielded to blisters applied to the arms, a seton in the neck, repeated purgatives, and injections into the eustachian tube.

CHAPTER III.

On polypus in the posterior nares, and other bodies which may compress the eustachian tube and thus produce deafness.

Valsalva states that deafness occasionally results from closure of the eustachian tube. He relates two instances of it; one of a gentleman who lost his hearing in consequence of a polypus in the nose, which extended as far back as the uvula; the other of a countryman who had an ulcer on the left side of the uvula. When a tent, dipped in some detergent liquor, was placed upon the part the patient heard nothing with the left ear, but he recovered his hearing in that ear as soon as the tent was removed.

Tulpius also speaks of deafness and ringing of the ears caused by a tumour of the palate, near the tube.

The causes, symptoms, and treatment of this disease being given in the practical works of medicine, and, indeed, the disease having but an indirect relation to the diseases of the internal ear, I do not think it proper to enter into details on the subject.

The Memoirs of the Academy of Sciences for 1705, mention a very remarkable fact. A young man, twenty years of age, became suddenly deaf-and-dumb, from having his throat pinched by a very strong man, with whom he had an affray. All the remedies which could be devised were found ineffectual.

It is to be presumed that the excessive turgescence of the tonsils, of the palate half-arches, and of the pituitary membrane which lines the orifice of the eustachian tube, caused by the violent compression of the throat, was the cause of the deafness; and that some injury of the recurrent nerves was the cause of his becoming dumb.

Without being sceptical, we may doubt the correctness of the above assertion, at least in regard to the permanent effect of the compression upon the organ of hearing; for it is not to be believed that the engorgement of the parts which surrounded the orifice of the tube would not subside in the course of a few days, and that the patient would not recover, at least in part, the faculty of hearing.

Nevertheless, there is one circumstance which might lead to belief in the continuance of the deafness, after such an injury. This might be the case when an extravasation of blood has resulted from such a degree of violence, and when that fluid has been poured into the canal of the tube, or into the cavity of the tympanum and has coagulated there. The memoirs also state "that all the remedies which could be devised were found ineffectual." But what these remedies were they do not state.

Were such a case to occur to me, I would employ the following means: Bleeding from the arm, repeated according to circumstances; leeches to the neck; sinapisms to the feet; low diet; diluent drinks.

If, notwithstanding these means, the engorgement were not dissipated, which, however, can hardly be supposed, I would not hesitate to scarify the fauces, and especially the tonsils and the palate half-arches. I would apply a large blister between the shoulders, and another on the anterior part of the neck. These means I am persuaded would suffice to disperse the swelling however considerable it may have been.

If, after the complete resolution of the swelling of the throat, the deafness should continue in the same degree, we should have reason to presume that there was an extravasation of blood, or some other fluid, in the cavity of the tube or that of the tympanum. Then injections of warm water merely, thrown into the eustachian tube, would suffice to restore the functions of the organ of hearing.

SECTION V.

ON DISEASES OF THE LABYRINTH.

THE labyrinth may be affected with the same diseases which affect the cavity of the tympanum. I shall limit my observations: 1st, to those of the membranes of the foramina, rotundum and ovale; 2d, those of mal-formation in these foramina; 3d, those of mal-formation of the labyrinth; 4th, inflammation of the membrane which lines the cavities of the labyrinth; 5th, degeneration of the liquor of Cotunnus; 6th, deficiency of that fluid. Mundini found the cochlea consisting merely of one spiral turn and a half.*

CHAPTER I.

On the diseases of the membranes of the foramina, rotundum and ovale.

"THESE membranes," says Leschevin, "may, in old age, become thick, hard and dry, as does the tympanum. Besides, the membrane of the foramen ovale may also become relaxed by destruction or paralysis of the muscle of the stapes, which muscle, in its natural state, serves to render this membrane tense."†

Valsalva thought that the opening of the foramen ovale was closed by a membrane like that of the foramen rotundum. He asserts that he has found it ossified in the ear of a deaf person.‡

* Opusc. Acad. Danor. 1791, t. vii.

† Prix de l'Acad. de chirurg. t. iv. in 4to. 1re. partie.

‡ Valsalva, t. iv. p. 306.

The causes and symptoms of thickening, induration and relaxation of these membranes, are the same as those which characterize the same affections of the tympanum.

No remedial means can be employed in the two first affections. For relaxation of these membranes, we may employ, with advantage, the means pointed out in chapter second of the first section.

The membranes of which we speak may be corroded and destroyed by suppuration. M. Leschevin, in his memoir on diseases of the ear, has given instances of it.

This lesion is irremediable, and the patient loses, without hope of recovery, the faculty of hearing in the affected ear, because the liquor of Cotunnus escapes and leaves the nervous pulp, which lines the semicircular canals and the cochlea, in a dry state. This nervous tissue we know to be the immediate seat of hearing.

CHAPTER II.

On mal-conformation of the foramen rotundum and of the foramen ovale.

These openings, the first of which, in its natural state, is closed by a membrane like that of the tympanum, and the second by the base of the stapes to which it is united by a delicate ligamentous substance which hermetically seals it; these openings, I say, by primary mal-formation, may be preternaturally small or altogether wanting. Of this we have related a case already. The following is another instance of their being preternaturally small.

"In the temporal bone of a full-grown fœtus, I found," says M. Lobstein, "the foramen rotundum of the tympanum extremely small, forming a very oblique opening which scarcely

admitted a small probe. If, as Scarpa assures us, the size of this foramen diminishes with the advance of age, and if it be smaller in the aged than in the young, this fœtus, in process of time, should necessarily have had it closed.' The remark, it appears to me, deserves to be repeated. It points out a new source of deafness, depending upon mal-formation of the internal ear. I have observed," continues the professor, "that the construction of which I speak was produced by super-abundance of the osseus matter in the midst of which this foramen is formed. Cotunnus has made a similar remark in regard to a foramen which was already totally closed. Is it not possible that such a disposition may exist in the foramen ovale; and that the promontory becoming more elevated and larger in all its dimensions may render this foramen smaller, and thus push from its place the stapes which occupies it? I am confident that, on carefully examining the organ of hearing in its most obscure* parts, we shall greatly enrich the history of diseases of the ear."†

CHAPTER III.

On mal-conformation of the labyrinth.

NATURE may leave something imperfect in the structure of the labyrinth; either in the vestibule, the cochlea, or the semicircular canals; or, if we may so say, may have neglected the organization of the labyrinth altogether, as appears from the following fact:

"A child in the alms-house of this city appeared to have

* It is to be desired that physicians to deaf-and-dumb institutions should suffer no opportunity for port-mortem examination to escape them.

† Rapport sur less travaux anat. de l'école de med. de Strasbourg, premier trimestre de l'an xii.

been deaf from birth. The loudest sounds did not appear to make any impression upon him; nevertheless he uttered imperfectly some syllables, and he was prompt in seizing the expression of the lips and of gestures. This child having at length died of an adynamie fever, the disseetion of the organ presented the following condition of the parts."

"The external ear was well formed, and the membrane of the tympanum was in its natural state; but the cavity of the tympanum was filled with a mucilaginous matter. No traces of the small bones were found. The eustachian tube was in its natural state. The immediate organ of hearing was entirely absent; that is, the vertibule, the coehlea, the semicircular canals and the foramina, rotundum and ovale, were altogether wanting."*

Does there exist any symptom which may enable us to aseertain or at least to presume the existence of mal-formation? The following I regard as data which indicate it. Besides that the individual will be completely deaf, he will not perceive the beats of a watch when the handle is held between the teeth; nor will he perceive the sound of a stringed instrument, when the experiment of Diemerbroeek is repeated. Under these cireumstanees one may be sure that the immediate organ of hearing is wanting, or that it is essentially defective, and that the deafness is incurable.

But if it be merely a collection of mucus which obstructs the cavity of the tympanum, the mastoid cells or the eustachian tube (and this is very often the case with congenital deaf-mutes) the patient will be less completely deaf; besides, on making the experiments which we have directed, he will

* I have derived this case from M. Montain, Jun. doctor of Medicine and surgeon-in-chief to the hospital de la Charitè de Lyon.

hear the beats of a watch and the tones of the musical instrument.

In the latter case nothing is necessary to make the individual hear, but to relieve the organ of the mucous matters which obstruct it, and to stimulate it slightly. Both objects will be accomplished by means of injections thrown into the interior of the ear. These injections should at first be emollient, and then tonic. These simple means will suffice to recover the organ of hearing from the state of insensibility in which the want of exercise will have kept it.

CHAPTER IV.

On inflammation of the nervous tissue of the labyrinth.

We give the term *otitis* to acute inflammation of the membrane which lines the cavities of the internal ear, but especially to that which affects the nervous substance which lines the cochlea and the semicircular canals.

I shall adduce two instances to show that the nervous tissue of the labyrinth is susceptible of a very intense inflammation. My colleague Dr. Viricel former surgeon-in-chief to the Hotêl Dieu of this city, furnished me with the following cases:

"On the 16th of February, 1806, a patient in the surgical ward, who had merely a small ulcer upon the left leg, and who lay opposite a window, was attacked in the night with an acute pain in the interior of the ear. The pain was accompanied with a violent fever which I thought to be of the catarrhal character. Five hours after the occurrence of these symptoms, the patient became delirious, apparently in consequence of the extreme pain and intensity of the fever. Internally I gave soothing anodyne remedies; applied a blister to the left arm, and directed the application of a mustard paste to

the neck; but notwithstanding the use of these means together with injections and pediluvia strongly charged with mustard, the symptoms increased and the patient died on the third or fourth day after the attack."*

"This individual, vigorous, and of an arid, bilious tempera ment, died so suddenly that I wished to ascertain the condition of the parts which had been the seat of the disease. I discovered no marks of disease in the brain; but on examining with great care the interior of the ear, I found the drum almost completely filled by the mucous membrane, which had become swoollen and was of a dark-red colour. The cavities of the cochlea and semicircular canals contained matter of the colour of iron-rust, and like reddish pus; from which I concluded that a very active inflammation of several deep-seated parts had caused the death of the individual."

"Five days after the death of the person of whom I have been speaking, another patient, about fifty-five years of age entered the hospital on account of a pain in the right ear. The fever and pain had been present for twenty-four hours. Directed by the port-mortem examination which I had recently made, I immediately applied leeches behind the ear, a blister to the neck and other means which I have named above; but they were not attended with success. The symptoms

* We may with propriety query whether such would have been the result had means more energetic and appropriate been employed. The practice in the above case was obsolutely puerile. Trusting to soothing means under such circumstances, is like attempting to restrain the violence of a raving mad-man with bland words instead of putting him at once in a strait jacket.

This patient should have been freely bled, both generally and locally; cold applications should have been applied to the head, and, indeed, the whole phalanx of antiphlogistic means should have been put in requisition against an intense inflammation which had evidently seized upon an important organ. N. R. S.

persisted; on the fourth day delirium supervened; on the seventh the patient uttered agonizing cries, which the pain extorted from him. Pain, which opiates given in large doses were unable to subdue, terminated his existence."

"On opening the body I found the cavity of the tympanum filled with a viscous matter like pus, and very thick. The semicircular canals were filled with a serous fluid which seemed alone to occupy these cavities, with the exception that there were portions of membrane of a red colour."

"These facts would induce me in similar cases to apply, in the onset of the diease, a blister upon the ear. This remedy has with me been successful in many cases which occurred during the same epidemic constitution of the atmosphere which prevailed in February, and which continued for three months in 1806, as is manifest from records made by me at that time."

From the facts reported above it is obvious that a damp and cold atmosphere, and the repulsion of an accustomed purulent discharge were the efficient causes of the form of inflammation which we describe.

Intolerable pain in the ear, intense fever and delirium, are the symptoms which characterize this formidable disease.*

*I believe that in cases like those quoted above we may confide in the good effects of general bleeding, copious and frequently repeated, also of emollient cataplasms applied over the temporal and mastoid regions of the diseased side. The ear having but few capillary vessels, would be but little influenced by leeching; but when after the employment of this treatment the symptoms persist, we should presume that they depend upon a collection of pus filling the cavities of the internal ear and compressing the organs which are lodged there. In this case ought we to endeavour to favour the escape of the pus by injections thrown into the eustachian tube? I think that, in consideration of the severity of the symptoms; the difficulty that would be experienced in performing the operation upon a patient suffering so intensely, and often delirious, and the pain that would be occa-

This is a case for prompt and vigorous treatment; the least delay, even the loss of a moment may be fatal to the patient.

At the onset of the disease, blisters should be applied around the ear as was done with so much success by M. Viricel; bleeding from the arm of the diseased side, repeated according to the intensity of the symptoms; leeches to the temples; pediluvia strongly charged with mustard; emollient injections; and if the otitis is caused by the healing of an ulcer, or any other issue, we should hasten to restore the suppressed discharge.

The regimen should be severe; veal or chicken water, and light broths are proper for nourishment. Ptisans of mucilage with nitre, and of whey, should be the ordinary drinks.

I would not recommend the employment, either internally or externally, of any variety of narcotic. Experience has often shown that in acute inflammations they are rather injurious than useful.

I see no objection to the introduction into the cavity of the tympanum and mastoid cells, by the eustachian tube, of warm milk combined with the decoction of the flowers of mallows, &c. These liquids, injected with extreme care, will operate as an internal bath which cannot but have the happiest effects.

The treatment should be concluded with the employment of one or more purgatives, according to the exigency of the case, in order to hasten the resolution of the engorgement of the membranes which have been inflamed.

Should the inflammation terminate in suppuration, hearing will be lost without hope of recovery. But we ought, at

sioned by the instrument in parts participating in the inflammation, we ought to employ means more prompt, easy of application and safe—to make an opening in the membrana tympani without delay, and then to facilitate the discharge of the pus by injections of warm water thrown into the external orifice of the ear. Th. P.

least by the employment of injections into the internal ear, to deterge the ulcer, remove the pus, and rescue the patient from a digusting and even dangerous disease.

When the inflammation terminates in gangrene, death soon follows. We have given two instances of it.

CHAPTER V.

On degeneration of the liquor of Cotunnus.

This fluid is susceptible of being changed in its character. Mr. Cline, an English surgeon, on dissecting the body of a deaf-mute, found the vertibule, the cochlea and the semicircular canals filled with a substance which had the consistence of cheese, instead of the liquid which they ordinarily contain.

What can be the cause of such a degeneration of this liquor? Experience and observation are as yet silent in regard to this point. We may at least endeavour to establish the diagnosis of that form of deafness in which the disease arises from obstruction of the labyrinth, resulting from degeneration of the liquor of Cotunnus.

If injections, thrown into the eustachian tube, pass freely into the cavity of the tympanum, and thence into the mastoid cells, which will be ascertained by the impulse which the injected liquor makes upon the membrana tympani, and a kind of slight itching which the patient will feel in the mastoid region, and if, on repeating the experiment with the watch, and with the strings of the musical instrument, the individual hears the sounds of neither, one may be almost certain that the disease is located in the labyrinth.

This cause of deafness cannot be removed by any means at present known to us.

CHAPTER VI.

On the wasting of the liquor of Cotunnus.

"The wasting of the liquor of Cotunnus," says M. Richerand, "produces dryness of the labyrinth, which gives rise to deafness in consequence of induration of the accoustic nerve. This is a frequent cause of the deafness of old age."*

Undoubtedly Professor Richerand has collected facts which substantiate the latter assertion; it is, therefore, to be desired that he had related some of them.

Another more frequent cause than that of old age conduces to the wasting, or rather the evacuation of the liquor of Cotunnus; this is long-continued suppuration in the cavity of the tympanum, which terminates in the destruction of the membrane, closing the foramen rotundum, detaching the small bones and hence effecting the opening of the foramen ovale, closed by the base of the stapes.

One of these barriers being destroyed, the liquor is poured into the cavity of the tympanum and flows out by the eustachian tube. The labyrinth remains empty, the acoustic nerve is no longer impressed by the undulations of the liquid contained in it, and the perception of sounds is destroyed. The patient will hear, it is true, the sound of thunder, of artillery, bells, and even of a drum; but the most distinct sounds of the voice, and those given by musical instruments are never heard. The following case substantiates this assertion.

A young man deaf-and-dumb from birth, sixteen years of age, heard the sound of cannon and of thunder; he also heard the beating of a watch both when it was applied to the ear, and when the handle was held between the teeth. When any one spoke to him through a hearing trumpet, he heard the noise

* Nouv. Elem. de Physiol. t. ii, sens de l'ouïe.

but not the articulate sounds. He imitated the noise which he heard but uttered no distinct syllable.

When any one struck upon a table behind him, he counted the blows with his fingers, which he ceased to do when the blows ceased.

An injection thrown into the eustachian tube penetrated not only into the cavity of the tympanum and mastoid cells, but even into the labyrinth. He signified this by the circular movement of his hand around the ear. This last circumstance I regard as a sign indicative of the destruction of the membrane of the foramen rotundum or of the separation of the base of the stapes from over the foramen ovale.

Art furnishes no means by which to remedy the defect of structure of which we have been speaking.

SECTION VI.

ON DISEASES OF THE ACOUSTIC NERVE.

The disease which most frequently affects the acoustic nerves is palsy.

There are many causes which may produce this affection; as, for instance, the translation of some morbific humour, a sanguineous congestion, steatoma, an exostosis, worms in the stomach, &c. &c.

We find in the *Mémoires des Curieux de la Nature* (décade 3. e, articles 7 et 8, observation 103 e.) an account of a man sixty years of age, who, immediately after having been cured of deafness, was attacked with palsy of the right side, which circumstance could not but be regarded as a metastasis.

Drelincourt found in the head of a man who died of apoplexy, a steatomatous tumour between the cerebrum and cerebellum, which had at first produced blindness, afterwards deafness, and finally an abolition of all the animal functions.*

Compression, or obstruction of the auditory nerve, may be confined to the nerve itself, or be extended to the cerebral mass. In the former case the deafness may occur at once, or gradually, and the organ of hearing is the only part which suffers; but in the latter case, deafness is preceded by stupor, paralysis, or the abolition of some other sense.†

Each of these causes has its peculiar mode of acting on the acoustic nerve and its own peculiar symptoms. The difficulty is so to discriminate these phenomina as to be able

* Bonnet, Anat. pratiq. sect. 2, obs. 53.

† Duverney, Traité de l'ouïe p. 157.

to distinguish one cause from another. Until our science shall have reached this point, our prognosis will be vague and our treatment uncertain.

The peculiar circumstances which may have preceded the palsy may, nevertheless, throw some light upon this subject. For instance; if in consequence of a blow, or a fall upon the head, with or without hemorrhage from the ears, the nose, or the mouth, the patient becomes suddenly or gradually deaf, we may presume that extravasation of blood is the immediate cause of the deafness.

But where will this extravasation have taken place? In the cavity of the tympanum or in the internal temporal fossa, near the petrous portion of the temporal bone? I have pointed out the symptoms which characterize the first variety of extravasation.* That which indicates the second, is a painful point, deep in the temporal fossa, where the collection of blood exists. The patient is disposed to lie on that side of the head rather than on the other.

Cases of steatoma and exostosis are much more obscure; the palsy comes on only by degrees, and it is not till after death that we can develope the cause of the disease.

Worms in the stomach are said by some to give rise to this form of deafness. The diagnostic criteria will here be of great assistance. If the patient has suffered no blow upon the head; if he has not fallen upon that part; if there has occurred no suppression of any humour whatsoever; if there are present any symptoms which indicate the presence of worms; if, besides a want of appetite and a foul mouth, there occurs the discharge of one or more worms, either by the mouth or by stool, and after their discharge the patient hears

* See chap. iv, of the second section.

better, there is strong presumption that there exist worms which cause the deafness.

The causes of paralysis of which we have spoken act, some mechanically, as the extravasation of blood, steatoma and exostosis; others sympathetically, as do worms in the primæ viæ. Adynamic and ataxic fevers affect the acoustic nerve in such a manner that the most practised eye can scarcely discover the traces of lesion, on making port-mortem examination.

From these different causes there arise two species of paralysis, the one with excess, the other with deficiency of irritability, or to use the phraseology of Brown, the palsy may be sthenic or asthenic.

The symptoms which mark the first variety, according to Grapengiesser are the following. "The patient hears better when he is addressed in a low tone and near the ear, than when he is addressed in a high tone and loud voice; better also in a damp season, and better when at rest than when exercising. In this case it is to be presumed that the deafness, whatever may be its degree, proceeds from a state of direct asthenia, that is from debility with excess of irritability."*

According to the same author the following phenomina denote the latter variety of paralysis.

"The deafness increases or diminishes according to the different states of the patient's health and general excitement; according to the vicissitudes of the weather, the particular hour of the day, &c."

"The patient hears better when he feels well, and when vigorous from a repast, from having taken wine, and after exercising agreeably; also better when in good spirits, than

* Bibliotheque Germanique, t. viii.

when melancholy; when the season is dry and the barometer rises, than when the season is moist and the barometer sinks."

"He hears better in the evening, than in the morning after sleep—not so well when he has slept profoundly for a long time, as when he has passed a disturbed night."

"Finally, he hears better and more distinctly when in the midst even of loud noises, as those of cannon, than when silence prevails around him.* I will add that, according to Mr. Cooper, when deafness begins to manifest itself, there is a diminution of the secretion of wax, which at length becomes completely suppressed as I have witnessed in an individual fifty-eight years of age."

Another characteristic sign of palsy of the acoustic nerve, pointed out by Mr. Cooper, is that the beating of a watch is not heard when it is placed between the teeth. I have had opportunities to verify this assertion on many subjects, and acknowledge the justness of it.

The following case goes to substantiate the latter assertion of M. Grapengiesser.

D*** fifteen years of age, deaf-and-dumb from birth, was insensible to the loudest peals of thunder, and to the firing of the heaviest pieces of artillery. On the 12th of May, 1812, I injected his ear through the eustachian tube. On the 14th he heard a buzzing in the right ear, and on the 15th in both ears. On using the subsequent injections the buzzing was always renewed. On the 20th the patient gave us to understand that he heard the sound of bells. On the 22d after throwing two injections into each ear, there was discharged, by the mouth, a piece of concrete matter of the colour and consistence of a slough, and of the size of a grain of buck-

* Ouvrage cité.

wheat.* This substance issued from the left ear. Afterwards there issued from the same ear small black pieces like tobacco, coarsely powdered. On the 25th, the patient heard the sound of a small bell, and early in June he heard the bell of a repeating watch placed at the distance of six inches from the porch of the ear. He also heard words uttered with a loud voice, such as *tabac*, *pain*, *vin*, *papa*. To the first word he responded *a....ba;* to the second *ba....in*, to the third *vou*, and to the fourth *ba....ba*.

He also heard the sound of a flageolet, and it appeared to affect him disagreeably, for he closed his ears with his hands and began to laugh.

There still remained in the acoustic nerve a considerable degree of insensibility, or that which Brown terms indirect asthenia; for the patient heard better when the atmosphere was dry, and when the north wind prevailed, than when there was rain or a storm. He heard better while exercising, than immediately after having slept.

I doubt not that I should have been completely successful, had the treatment been continued; but the parents fearing that if he perfectly recovered his hearing he would become subject to the conscription, opposed the continuance of the means which I proposed to employ. The following case which I report confirms me in my opinion.

The son of M. B. book-keeper of this city, twenty-one years of age, deaf-and-dumb from birth, aided by an uncommon degree of intelligence, learned to read, write, speak, and understand all that was said to him, merely by observing the motions of the lips. The teacher who instructed him was ignorant of the ingenious method of L' Epée and Sicard.

* Perhaps it might be supposed that this was merely a morsal of food detached from between the teeth, but all doubt will be removed when it is asserted that the mouth was directed to be washed before the injection of the ear.

Young B. scarcely heard the sound of cannon or thunder, and when any one spoke to him in a very loud voice, and close to the ear, he heard merely a confused noise. With the left ear he experienced not the slightest sensation.

Such as I have just described was the condition of the young man when the parents committed him to my care. I first examined the internal ear and then the fauces, and found both to be in their natural condition. Pursuing my researches with reference to the eustachian tube and the internal ear, I directed a canula into the right nostril. I entered the tube, without producing pain, and threw in an injection of warm water. The liquid entered, with facility, the cavity of the tympanum and the mastoid cells.

By this experiment I became convinced that the cause of deafness was not in these parts. It occurred to me that it must be owing to some defect in the labyrinth, or to palsy of the auditory nerves.

With this belief I deemed it proper to bathe the interior of the ear by means of injections. The water of Balaruc, warmed to from the 20th to the 25th degree of Réaumur's thermometer, was the liquid which I employed.

For eighteen successive days the injections were continued without any apparent success; but in the night of the 18th or 19th day my patient, all at once, heard the human voice. The next day he gave me to understand that, being asleep, he had been waked suddenly by persons who, with cries of joy, celebrated the safe arrival of the Duchess of Orleans, and made the air ring by repeating a thousand times the cry of *vive le Roi! vivent les Bourbons!*

From that moment the organ of hearing continued every day to improve. On the 17th day of the treatment the patient heard very distinctly when any one, without closely approaching, spoke to him in an ordinary tone of voice; but he distin-

guished better the deep tones of the male than the higher tones of the female voice. Grave sounds were heard more distinctly than acute ones. The sound of musical instruments was animating and agreeable to him: He distinguished the airs and endeavoured to catch the measure.

The prognosis to be pronounced in regard to palsy of the acoustic nerve is difficult in proportion as the causes which give rise to it are obscure. That, for instance, which depends upon sanguineous congestion, consisting either in extravasation, or repletion of the vessels which surround the acoustic nerve, is suseeptible of cure.

It is incurable when it depends upon the existence of a steatomatous, or fungous tumour, or an exostosis.

Palsy occasioned by the presence of worms in the first passage is susceptible of the most prompt and certain cure.

That variety which occurs in the progress of an adynamic or ataxie fever is difficult of cure; nevertheless, we may often treat it with some degree of success.

Treatment.—This should vary in correspondence with the causes which may have produced the disease. If the latter has been caused by sanguineous congestion, we should have recourse to blood-letting, repeated according to circumstances; to blisters between the shoulders, and to pediluvia charged with mustard. If the congestion has arisen from an attack of apoplexy, we should employ the same means, together with remedies calculated to relieve the head, applied externally and given internally. After these means, whether they may have had little or no success, injections should be employed as we have already advised.

Pierre Castro, first physician to the Duke of Mantua, employed an ingenious mode of treatment which appears to have been successful. After having purged with hellebore, agaric or syrup of cuscuta, he shaved the head of the deaf-mute,

along the coronal suture; he then anointed it with a liniment composed of *eau-de-vie*, nitre, oil of sweet almonds and the infusion of water-lilies. He directed the ears and the nose to be well cleansed, and the back part of the head to be combed, and caused the patient to chew a paste composed of liquorice, mastich, ambre and musk. Then some one spoke loudly to the patient, with the mouth over the coronal region, and thus succeeded in rendering the deaf person sensible to various sounds.

Shower-baths to the head might in certain cases be employed with great advantage as is proved by the following case.

A man became suddenly deaf-and-dumb, in consequence of an apoplexy caused by the imprudent suppression of old ulcers of the legs. After having employed in vain the ordinary remedies for apoplexy, thirty-two leeches were applied to the head, and the patient suddenly revived; but he remained deaf-and-dumb. He could move the tongue, and taste food; but he could not speak nor utter the least sound of the voice. After the ineffectual use of many articles, the author of the case employed showering. He chose a solution of sal ammoniac and *boule de mars*, (a preparation of iron and potash,) and let it fall from a considerable height upon the top of the head. As soon as the first drops had struck the head, the patient experienced a shock of the whole body. Upon repeating it the fifth time he became pale, and at the sixth he fell senseless upon the earth. After careful attention for half an hour, he revived, appeared very cheerful, slept tranquilly, and during sleep perspired freely. The showering was repeated on the third day; the same phenomina were observed, and the patient fell into a profound sleep, the perspiration collected in large drops on the whole surface of the body, and on his reviving he recovered the power of speech and of hearing. From that moment he was perfectly well, and no further attempt was made to heal

the ulcers on the legs, which had broke out anew from the use of vesicatories during the apopleetic attack.*

Deafness often results from blows and falls on the head. Instances of it have already been given; but I have elsewhere remarked that this variety of deafness is sometimes cured by the efforts of nature alone. The following case substantiates it.†

"In December, 1807, Francois M***, twenty-five years of age, was carried home insensible from a dock-yard, where he had been at work. This man while bearing upon his right shoulder one end of a large piece of timber, the other end of which was carried by another person, fell; his head struck with force upon the stump of a tree, whilst the opposite side of the head was pressed upon by the joist which was placed upon his shoulder. The patient discharged blood from the left ear, and manifested symptoms of concussion of the brain. Those symptoms slowly disappeared, and there remained nothing but deafness and a ringing in that ear. On the first of May following, there occurred stupor, vertigo, pain in the head and finally intense fever and dilirium. A considerable discharge of pus, which issued from the left ear, and which soon ceased, dispelled these symptoms. Hearing was perfectly restored."

In the *Bibliothique de chirurgie du Nord*,‡ we find some observations on a case of deafness associated with blindness. It was the result of a metastasis, (what the nature of the humour was we are not informed.) Blood-letting, blisters and aperients produced no favourable change. The author of the case then gave, four times a day, half a grain of tartar emetic,

* Bibliothèque de Chirurg. du Nord.

† This case was communicated to me by M. Perreymond, a distinguished physician of the city of Lorgues, department of the Var.

‡ T. i. 1re. partie.

together with six grains of gum ammoniac, and increased the dose to such a degree as every day to excite vomiting. Besides this he promoted the alvine discharges, also those of the skin and urinary organs. On the twelfth day the patient saw a little light; on the twenty-fourth he could discern large objects; at length both sight and hearing were restored, but more perfectly on the right side than on the left. The author administered the same remedies, also with complete success, in another similar case.

When palsy is caused by a steatomatous or fungous tumour, or an exostosis, which is very difficult to be ascertained, we should employ only internal remedies, which are calculated to resist the cause that may have given rise to the steatoma, &c. &c.

If the disease has been produced by worms in the first passages, emetics, purges and anthelmintics will suffice to remove the paralysis and to restore hearing.

Finally, when the disease is a sequel of ataxic or adynamic fever, we should first apply blisters between the shoulders, then a seton in the neck, and if these means are insufficient, we shold make use of injections thrown into the interior of the ear.

Besides the means of which we have spoken in the course of this work, relative to the treatment of the diseases of the internal ear, and the deafness which often results from them, it remains for us to speak of other remedies which have at various times been recommended. We name them here less for the sake of advising their employment than to give a complete history of all which has been done in attempting the cure of deafness whether congenital, or of accidental occurrence.

Electricity presents itself first in order, immediately after which we shall place galvanism because of its close relation to

the former. Next we shall speak of mineral and animal magnetism.

1st. Electricity has been employed as a remedy for human diseases for more than sixty years. Europe has rung with the reports of the brilliant successes which were said to have been achieved by this new agent, especially in Italy. But more recent experiments, made in Paris by the abbé Nollet, MM. de La Sône, Morand and other skilful physicians and learned philosophers, have proved the almost perfect inefficacy of this agent upon the diseases of the human body.*

The abbé Bertholon, in his work upon the electricity of the human body, devotes a long paragraph to the subject of deafness. He quotes a great many facts but none from his own experience.

"There have been made," says this author, "many happy and successful trials of this agent in deafness, a disease of which the principal causes are obstructions in the organ of hearing, or an affection of the nerves which are expanded there, which obstacles electricity is well calculated to remove."† He afterwards quotes a number of authorities, but none of these present a fact which can be regarded as establishing the efficacy of this agent.

Haller, after having subjected one of his patients to the influence of electricity during five days, by communicating the sparks, and by friction, relieved him a little, but had not patience to complete the cure in this manner.

The following facts, if we may credit them, speak in favour of the employment of electricity.

A lady became deaf in consequence of a milk-engorgement of the breast; M. Manduit dispelled it by applying electricity

* Dict. Encyclop. t. xii. in 4to. au mot électricité.

† De l'électricité du corps hum. t. 1, p. 502 et suiv.

forty-six times. During all this time there was a copius discharge from the nose, and the urine deposited a viscous and fetid sediment.

M. Manduit also asserts that he has restored hearing to a man forty years of age, deaf in the left ear for three years in consequence of small-pox, and in the right ear for three years in consequence of a malignant fever. This patient was electrified twenty-four times. There was a viscid discharge from the ear.* Notwithstanding the confidence which I have in the veracity of the author, the second case reported by M. Manduit cannot but cause me to doubt, especially in regard to the left ear. The results of seven cases which follow this leave me still in doubt.

M. Comus† states that he has cured two deaf persons who had become so by accidental disease. He asserts that on electrifying them, by insulation, they heard as well as if they had not been deaf; that they retained the faculty of hearing, the one many hours and the other many days after the experiment. The same author declares that the faculty was less when they were no longer insolated, and continued gradually to diminish till it no longer existed.

We learn from the cases stated by M. Comus, that the good effects of electricity upon the organ of hearing are not permanent, and that the patient presently relapses into his former state.

In the Journal de Médicine for November 1787, article Département des hôpitaux civils, we find cases of deafness treated with electricity by M. M. Poma and Rainaud.

"Of four patients," say the authors of these cases, "the two first appeared to derive some benefit from electricity; but

* Mem. de la Société de Med. année 1778.

† Journal de Physique, année 1775.

their cure may have been pronounced very doubtful. In regard to the third there was no ground for hope. The fourth appeared to be susceptible of very great benefit from the employment of electricity; at least so far as we may judge from the different experiments which have been already made upon analagous cases, and particularly those of M. Manduit."

The editors of the journal from which we derive these facts make the following reflexions.

"The experiments of M. M. Poma and Rainaud upon deaf patients were not successful. The reasons which they give for their being unattended with success are founded upon the supposed defect of the organ and want of perseverance in the employment of the remedy."*

What was ascertained by M. M. Poma and Rainaud, to convince us that their want of success arose from defect of the organ of hearing, rather than from the inefficacy of the means which they employed? Certainly nothing.

Since so many physicians have spoken of the employment of electricity in cases of deafness, both accidental and congenital, it is matter of surprise to hear M. Lebouvier-Desmortiers assert that this remedy, as applicable to congenital deafness, was discovered by himself:

"Those" says he "who, till now, have attempted the cure of congenital deafness, have supposed the disease to be caused by inspissated humours in the cavities of the ear and adjacent parts. They therefore employed the remedies best adapted to break up, dissolve, and evacuate the substances which disturbed or impeded the functions of the organ. Local bleedings, bitter infusions, purgatives, blisters, fumigations, injections—all have been employed, but none of them have suc-

* Journal de Med. Nov. 1787.

ceeded. I could entertain no hope, therefore, in regard to the employment of the same remedies. It seemed to me necessary to renounce every attempt, or to seek from some less common source, the remedy of which I stood in need. Shall I declare that I have discovered it? This assertion would be too bold, but I may at least assert that it produced such happy effects as to induce us to place confidence in its remedial powers. This agent is electricity."*

The effects of which he speaks are but of trifling importance. M. Lebouvier-Desmortiers treated but one deaf-mute, fifteen years of age. The treatment occupied six months, which the author divides into two epochs, the first from the 22d of December (year 7 of the Republic) to the 4th of April following, during which time he employed vapour baths and injections into the auditory meatus.

The second period began on the 4th of April, and continued to the 30th of June, during which he employed injections and electricity. He electrified the patient every day, most commonly twice and often three times.

M. Lebouvier-Desmortiers remarks that the patient heard a little with the left ear when addressed in a high tone, with a hearing trumpet placed upon the auditory meatus; that the right ear was impermeable to sounds; that the patient could not hear by the mouth the beating of a watch, the case of which was placed between the teeth.

During the three months of the employment of electricity the following effects were produced:

1st. The patient heard the words *papa and mama*, and counted with her fingers the number of syllables.

2d. She heard the sound of a pair of tongs when gently struck.

* Considerations on congenital deaf-mutes, p. 135.

3d. She heard the beating of a watch in the mouth.

4th. She heard with both ears by means of a hearing trumpet, even when addressed in a low tone.

5th. Finally, she heard the human voice, near the ear, through her cap.

The slight success which M. Lebouvier-Desmortiers speaks of so emphatically was not permanent, for, "six months after the treatment," says the author, "I went to see Maurice (this was the name of the patient) to ascertain the condition of the ears. I found her almost as deaf as on the day when I commenced the treatment, yet her recent deafness was an incontestible proof of the efficacy of the remedies upon the former."* This assertion appears to me to be very bold, to say nothing more.

That which M. Lesbouvier-Desmorticrs regards as a recent deafness, was nothing but the return of the former disease to its ordinary state, in consequcnce of withholding the influence of electricity from the nervous system, particularly the acoustic and fifth pair of nerves. It appears to me that the relapse of M. L. D's patient, instead of confirming the efficacy of electricity in such a casc, as this writer asserts, proves, on the contrary, that it is both transitory and inefficacious.

From the trials which have been made with electricity, both in congenital and in accidental cases of deafness, we are authorized to draw the following conclusions.

1st. Electricity is a remedy of but little efficacy, and in most instances its good effects are transitory and illusory.

2d. This remedy might be attended with some degree of success in partial palsy of the acoustic nerves.

3d. It will be useless in casc of obstruction of the eustachian tube, the cavity of the tympanum and the mastoid cells.

* Ouvrage cité.

4th. It is a dangerous remedy when applied to very irritable subjects; also to those who are subject to vertigo, epistaxis, cerebral congestions, pains in the head, &c. &c.

II. To Electricity galvanism succeeded; the domestic and foreign journals proclaimed its pretended marvellous achievements. It has been employed in all diseases which affect the human species, and particularly in deafness.

M. Grapengiesser, of Berlin, appears to have made galvanism, as applied to medicine, his particular study. He thinks that it may be employed with success in the following diseases.

1st. Palsy of the inferior extremities.

2d. Weakness of sight, and gutta serena.

3d. Partial or complete deafness.

I shall not here investigate its utility in the two first classes, but shall direct my attention merely to the latter, in which the author believes that galvanism is applicable merely to debility or palsy of the acoustic nerve, with suppression or diminution of irritability, whatever may be the degree of the affection; "for it is very proper," say MM. Brower and La Roche, "to make trial of galvanism in cases in which hearing is but in a degree impaired, if we are assured that the deafness proceeds merely from indirect asthenia."*

The symptoms which distinguish palsy with excess of irritability, from that characterized by defect of it, have been described at the commencement of this section. M. G. does not recommend galvanism in direct asthenia with excess of irritability. In this form it has never been successful.

Of nine cases of deafness, more or less complete, reported by M. G. there are three of congenital disease. The subject of the first case was a child of twelve years. The author

* Biblioth. Germ. médico-chirurgicale, t. viii.

does not state the number of times that he subjected the patient, to the influence of galvanism. He merely states that by the continued employment of the remedy he acquired the faculty of hearing in one ear to the degree that "he was able to repeat, word-for-word, what was spoken in a low voice behind him, to any person near, which words, however, he could not articulate correctly."*

He was but partially successful in the two other subjects, one of the age of five years and the other of six. M. G. ascribes this to the discontinuance of the treatment in consequence of the resistance made by the little patients.

Of the other six cases, the treatment of one was unsuccessful, and in the remainder the success was not triumphant in favour of galvanism, because it was employed in association with other remedies.

The medical journals of Paris also make mention of cures accomplished by galvanism in various cases of deafness.

I know not what degree of credence we ought to give to all these cases; for myself, I frankly declare that I have employed galvanism for various affections, especially deafness, both accidental and congenital, and that my attempts have been unsuccessful. Further, this agent in the case of Cartenon, (which I have given in the second section) was injurious. It brought back the buzzing sounds in the right ear and hearing become more obtuse.

The opinion of M. Rinauld concurs with that which I have just given. "According to him," says M. Suc, "if we appeal to those trials which have heretofore been made upon the organ of hearing, it is ascertained that the organ is not susceptible of any immediate influence from this agent."†

* Ouvrage cité.

† Histoire du Galvanisme, 1 er. partie, p. 159, et 160.

Galvanism is injurious and even dangerous, when the patient is subject to pains in the head and to congestions of blood in that part. It will be of no avail when there are obstructions in the eustachian tube, the cavity of the tympanum, or the mastoid cells. Finally, the remedy is so painful that few persons can endure its application.

III. Mineral magnetism is said to have been employed with success by Mr. Klarick, physician to the King of England, in a case of incomplete deafness with buzzing. He employed it for three months, three times a day, and for several minutes each time.*

This agent appears to me to be a very feeble remedy for disease; it is true that it has been employed with some appearance of success in rheumatic pains located in the teeth, and other parts of the body. It is asserted that it dispelled the pain as soon as it was applied to the painful part; but the pain returned with the same intensity as soon as the magnetic apparatus was removed. It is manifest, then, that the remedy is inefficacious, since it merely suspended the effect without removing the cause. Besides, to what cases of deafness could this remedy be applicable? It is asserted that it was successful in incomplete deafness, but what was the cause of this deafness we are not informed. It appears to me that no advantage could be derived from its employment, except in case of spasm of the auditory nerve. Nevertheless, I must confess that I am in possession of no fact which would authorize me to employ the remedy exclusively of other means.

IV. M. Hagstroem has employed, without success, animal magnetism, upon a man who appeared to be of a constitution proper for the observation of the effects which the agent might produce. The magnetic apparatus was applied regu-

* Journal économique, janvier 1767.

larly for three months. On being interrogated in regard to the sensations which he experienced he answered, always by signs, that he perceived no effect or relief, either in his ears or the rest of his body.

The public, I am persuaded, are out of conceit with the impositions of Mesmer, and are undeceived in regard to the numerous good effects of this pretended catholicon which is now falling into neglect. Nevertheless, it appears that new efforts have been made to revive it. Whether the works of MM. de Puy-Ségur and Deleuse, will accomplish this I am disposed to doubt.

V. It has been remarked, says Leschevin, that the external ear receives many rays of sound and reflects them toward the auditory meatus, and it is observed that this mechanism considerably increases the sensation. On this principle, (which is proved by observation of those whose ears are badly formed, or removed by accident, and who, in consequence, hear less perfectly) various acoustic instruments have been constructed, all of which have a large opening to admit the undulations, and a small one which is introduced into the ear and in which they all meet as in a focus. The more simple, the more useful are they, and perhaps the best of all these instruments is a curved conical tube in the form of a horn.*

It is unnecessary that we should dwell longer upon this subject; the various forms with descriptions of these acoustic instruments may be seen in many works on surgery, and particularly in the Dictionary of the Medical Sciences.

* Journal de Médecine, année 1793.

CONCLUSION.

It is manifest, from all which has been stated in this work, that deafness may arise from various causes, and that its treatment should correspond to the cause which may have produced it.

I have pointed out with as much precision as I could, the diseases of the internal ear from which deafness arises; I have explained their diagnosis, their causes, their symptoms, and the means of cure. I have also designated those which are irremediable. I have suggested some improvements of Cooper's mode of operating, and have invented instruments proper for probing and injecting the eustachian tube through the nasal passages.

Such is the result of my reseaches, of my reflections, and my practice. May my efforts be acceptable to the profession, to whom they are submitted! If so, I shall be assured that they are useful to mankind.

SUPPLEMENT

ON THE

DISEASES OF THE EXTERNAL EAR,

BY THE TRANSLATOR OF THE FOREGOING ESSAY.

The diseases of the external ear, being obvious to the eye, and accessible to the hand of the surgeon, are recognised with far more ease, and treated with much more precision and success than those which affect the deep-seated parts of the apparatus of hearing. They are also less important, in as much as they do not so often impair the function of this valuable sense, and yet they are not uninteresting in this respect, as they sometimes extend to the more essential organs, or are the effects and symptoms of more deeply seated disease.

All the parts of a complicated apparatus are intimately associated with each other by nervous sympathy. In their vital qualities they must be identified with each other, in order that they may co-operate in their functions. Their morbid associations must necessarily be equally intimate. When, for instance, from any cause inflammation occurs in the external appendages of the eye, there immediately takes place a morbid sensibility in the interior of that organ and the eye becomes intolerant of light. Did the cause persist, it is

obvious that permanent disease would result in the interior apparatus. This sympathy is owing to the vital correspondence which, in health and disease, is perpetually going on between the eye and its appendages, through the branches of the fifth pair of nerves.

The same vital intercourse, though less demonstrable, exists between the external and the internal ear. Certainly, then, the diseases of the former are important, not only because they are in themselves disgusting and troublesome, but because they are often the precursors of more serious disease.

Wounds of the external ear.

A word in regard to the *treatment* of these injuries is all that will here be required. Whether the wound be incised, lacerated, punctured, or contused, the object of the surgeon should be to preserve the form and integrity of the organ. This will be best accomplished by the most simple means. When the separation of parts is extensive, it is first necessary to bring them nicely in opposition and to maintain them thus. The peculiar form of the organ requires the mode of dressing to be something different from that which is elsewhere employed. The interrupted suture will be needed and should be passed merely through the integuments of the organ. In extensive cuts it may be necessary, for more perfect security, to apply stitches on both sides of the organ. Adhesive straps should then be nicely adapted to the parts, and the wound be covered with pledgets of fine lint, which will adhere by the drying of the blood that oozes from the wound.

We are advised by most surgeons* to cover the ear with a

* Dictionnaire des Sciences Medicales, tom. xxxvii. Article Oreille.

bandage passed round the head, the ear being protected from unequal pressure and displacement by bolsters of lint or cotton placed around its margin. I can discover, however, no utility in the employment of a bandage; the adhesive straps and the loose lint will be sufficient to protect the organ from the atmosphere, unless the season be inclement, and then a loose elastic cap may be used, the ear being protected by compresses placed before and behind it.

We need never despair of effecting re-union unless the organ be completely dissevered. Although there may be but the slightest attachment, the vitality of the parts and the integrity of the organ, may often be preserved.

Should the violence inflicted upon the ear be so great as to threaten it with gangrene, means should be employed for the purpose of preventing such a result. If violent inflammation be the first effect, we should endeavour to assuage it by the usual antiphlogistic means. Should gangrene manifest itself, no better local application can be employed, to arrest its extension, than the fermenting cataplasm, which is both antiseptic and stimulant.

I have said nothing of hemorrhage from wounds of the ear because the arteries of the organ are so minute as that they almost always spontaneously cease to bleed when divided. Sometimes they may require the ligature.

Ulceration and sloughing of the external ear from pressure.

When an individual, in consequence of severe and protracted disease, is for a long time confined to his bed, and, on account of local pain, is compelled to repose constantly upon one side, the ear, by the continued pressure even of the softest pillow, becomes affected sometimes with ulceration and some-

times with sloughing. This the more readily takes place because of the languid state of the circulation in such cases, and the inability of the capillaries to resist such injury. In phthisis this injury frequently results from the patient being often compelled to lie constantly upon one side.

Of course the first object of the physician should be to obviate the cause, and this is accomplished by the employment of a quilted pillow which has a hole in its centre corresponding to the ear. Simple dressings should be applied to the ulcer.

Mal-position of the external ear.

Although the external ear, in man, is by no means so important a part of the acoustic apparatus as it is in some other animals, it cannot be doubted that its peculiar form is designed to favour the reflection of the undulations of the air, in such a manner as to concentrate them upon the membrana tympani. This end will certainly be defeated whenever, from any cause, the ear acquires an unnatural attitude in regard to the head.—Mal-position of the ear also produces an unseemly appearance, which, of itself, is sufficient to induce us, if possible, to correct the evil.

Mal-position of the ear almost always results from some unfortunate habit of wearing the hat or head-dress. Boys often wear the hat so low upon the head as either to push the ear outward, and to cause it project from the head, or to compress it against the head and cause it to assume too close a position. The latter often occurs in females, from confining the ear too closely with the head-dress.

To remove the deformity it is only necessary to correct the habit.

It may be well to remark here, that other evils sometimes result from improperly covering the ear with head-dresses, caps, &c. Nature evidently designed that the ear should be exposed, that the atmosphere should at all times have free access to the membrana tympani, and that the air contained in the meatus should be frequently changed. If the external orifice of this canal be too closely covered, the air stagnates in the cavity, the exhalations are confined, and the organ acquires a morbid sensibility. Each of these circumstances favours the occurrence of ulceration. The practice of stuffing the ears with cotton, is obviously still more injurious.

Imperforate condition of the external meatus.

This imperfection is generally congenital. Most frequently it is associated with some irremediable defect of both the external and the internal ear which precludes all surgical means. Yet, sometimes there exists a mere continuity of the external integuments over the orifice of the meatus. In such a case we may readily ascertain that the internal ear is perfect, by the fact, that the individual hears with that ear though indistinctly, and that the beat of a watch held in the teeth is distinctly heard; also from the fact that air may be forced into the tympanum.

If the obstruction yield to pressure, we may infer that it is membranous, I then should not hesitate to puncture it with a lancet, and to introduce a piece of bougie for the purpose of preserving the opening. Or the septum might be cut away with an instrument like an iris-knife. Caustic might be preferable in some cases.*

*Since the above was written I have been consulted in regard to the propriety of attempting such an operation on an interesting little patient in this city. The child is now three years of age. He was born with imperforate

Were the passages of both ears firmly closed we might hazard the deep introduction of an instrument, for the important purpose of restoring the function of these organs. It should be conveyed in the direction of the meatus and almost to the supposed seat of the tympanum. There would be no danger of wounding any important organ.

Sometimes the external meatus is obstructed by the mal-position and unusual size of the tragus, this cartilage lying obliquely over its orifice. In such a case Monfalcon * recommends to obviate the evil by introducing into the meatus a small hollow cylinder of silver which will keep the orifice open and press forward the tragus.

"M. Boyer has pointed out a species of mal-formation of the external meatus worthy of notice, in which the canal is flattened and the opposite walls pressed into contact with each other for some extent. He was consulted by an individual who had been rendered almost perfectly deaf by this deformity. He constructed a gold canula, of the form and diameter of the meatus, expanded at its external orifice; this he introduced into the meatus, and the patient, who constantly wore it, from that time continued to hear perfectly."

meatus on one side, and with mal-formation and partial deficiency of the external ear. It presents, indeed, the appearance of a mere rudiment of the perfect organ, and disfigures that side of the head.

In place of the orifice of the meatus there is a small fossa, and just before it a small vestige of the tragus; but when I seize the lobe of the ear and draw it outward, this fossa follows, and we discover that it has no connection with any cartilaginous or bony canal. I can feel, indeed, by pressing the finger firmly into the fossa, the extremity of a cartilaginous body pointing outward, but it seems to have no hollow.

I am persuaded that in this case, the internal ear is equally amorphous, and consequently that no operation would be of any avail.

The external ear of the opposite side is larger than usual, and the function of the organ unusually perfect.

*Dictionnaire des Sciences Médicales, tom, xxxviii. Article Orcielle.

Foreign bodies in the meatus externus.

Nature has certainly formed the external orifice of the meatus very admirably for the purpose of preventing the ingress of foreign bodies and insects. They cannot have direct access to it in consequence of its obliquity and the protection which it receives from the tragus. The concha, so well devised for the purpose of throwing the undulations of air into the ear, reflects from it all other bodies. The orifice of the meatus is also fortified by a sort of palisade of small hairs, pointing outward. The secretions of the cavity, being bitter and offensive, deter insects from nestling there.

Notwithstanding these defences, small bodies are sometimes pushed into the meatus, and getting wedged there, cause great irritation and consequent mischief. An alarming inflammation sometimes occurs and is propagated to deep-seated parts; ulceration takes place in contact with the body and morbid granulations are formed around it. Thus the meatus will be completely closed, and hearing greatly impaired.

These bodies are most apt to be the toys of children, such as glass beads, shot, cherry stones, kernels of grain, &c. &c. When those bodies which are hard, round, and smooth, are forced deep into the meatus, it is sometimes a matter of extreme difficulty to remove them, because, from their form and smoothness, they elude the grasp of forceps and other instruments used to extract them, and are forced still more deeply into the ear.

Kernels of grain, by absorbing the moisture of the passage, become greatly swollen, distend the passage and for a time give much inconvenience; but as they become soft and decay, they are at length removed without difficulty, or are spontaneously discharged.

The removal of hard spherical bodies should be attempted

with the utmost caution, lest they be thrust inward so far as even to rupture the membrana, and enter the tympanum. A substance of this kind should never be forcibly seized with the common forceps, the blades of which cannot be insinuated between the meatus and the body. They will certainly slip from it, and thrust it more deeply in. The best instrument which I have used for this purpose is a steel stylet which tapers from one extremity to the other, in order that the extremity held in the fingers may be sufficiently inflexible to be used as a handle. The other extremity has the size of a very small probe, is obtuse, flattened laterally, and bent at the point. This point is to be insinuated beyond the foreign body, and the instrument used as a lever to disengage it.

Where this is insufficient I would employ forceps with long slender blades, bent nearly at right angles about an inch from their points, which should be thin, a little convex on the out side, and slightly curved inward. They are bent, that the hand of the operator need not exclude the light. The mode of using them is obvious. This instrument will resemble that of Lamotte, which was shaped like the beak of a woodcock.

Some have recommended that an incision be made in the cartilage of the meatus in order to obtain more room for the extraction of the body. In ordinary cases I cannot conceive how any advantage could be derived from such an operation. However, the cartilaginous opening may sometimes be unusually contracted, and were I to experience much inconvenience from it, in the use of the instrument, I would incise it obliquely upward and outward.

Sometimes the foreign body may be cut to pieces with a couching needle and thus removed, as was done by Professor Gibson.

When the substance has been removed the ear should be

deterged by an injection of warm milk and water, and if there be inflammation leeches should be employed, &c. &c.

I should here remark that we ought never to confide in the conviction of the patient that there is a foreign body in the ear. Before introducing any instrument we should examine the meatus with great care. Not long since, a young woman called upon me to remove a pin supposed to be lodged in the ear. A small shining body was seen deep in the meatus which was supposed to be the pin's head and many attempts had been already made to seize and remove it. Although these attempts had been made with skill and caution, some irritation and swelling were produced. On examining the ear with great care, in a manner hereafter to be described, I became convinced that there was no offending substance in the ear, and that the supposed head of the pin was merely a drop of semi-fluid substance adhering to the tympanum and reflecting the light in a peculiar manner.

Indurated wax in the meatus.

A morbid state of the secretions of the meatus is very apt to be associated with a diseased condition of the internal ear, but sometimes the accumulation of hardened wax in the ear, is the sole cause of a considerable degree of deafness. In either case it is very important that its presence be ascertained, and that it be removed.

We ascertain its presence by inspection, which is best accomplished by placing the head in such an attitude as to suffer the sun's rays to enter the meatus and impinge upon the tympanum. To effect this, the operator must seize the external ear, and drawing it outward from the head, extend and straighten the cartilaginous part of the meatus. I have been

able to inspect the ear more perfectly by introducing, at the same moment, a steel director, with its groove toward the meatus and its convex side pressed firmly against the anterior walls. The passage is thereby both straightened and expanded.

If there be no wax present the tympanum will be seen, of a pearly white colour and concave. If wax be present the cavity is less deep than it should be, and its bottom black.

To remove this mucо-ceruminose matter, it is only necessary to inject the ear frequently with soap and water, or an alkaline solution. The stream should be thrown in with force and many times at each sitting. Sometimes the substance will be so impacted in the organ, that it will be necessary to inject the ear for many days before it can be dislodged, and to aid the removal of it with the probe. Hard cylinders, more than half an inch in length, and of the form of the meatus, are sometimes thus removed and hearing greatly improved.

When the obstructing substance has been removed, it will be necessary to make use of some stimulating lotion which shall excite the membrane to the healthy exercise of its functions. For this purpose the infusion of cloves or cinnamon may be employed; also the water of ammonia much diluted.

Insects in the meatus.

Insects sometimes nestle in the external meatus, notwithstanding the pains which nature has taken to make it an uncomfortable dwelling for them. Sometimes a mischievous fly deposits her eggs there which soon become larvæ and produce intolerable pain, itching, and noise in the ear. I knew an old gentleman in Vermont into whose ear, while he was sleeping in his orchard, "his custom always of the afternoon,"

not the "juice of cursed hebenon," but the eggs of an insect were dropped. The next day they became maggots, and "then began the tempest in his head." They occasioned such an intolerable sensation and he flounced about in such a manner that it was almost impossible to keep him still while there was dropped into the ear a small quantity of brandy, which effectually quieted the marauders.

In another instance I knew a honey-bee to fly directly into the meatus. Finding it not to be a nectary he struggled to escape, and in so doing scratched the tympanum with his claws. This produced a perception of sounds louder than peals of thunder, together with excruciating pain. The sufferer flung about like one distracted, and exclaimed so incoherently that nobody could tell what calamity had befallen him, till the bee fortunately escaped.

Insects in the ear are promptly destroyed by pouring into the meatus whiskey, brandy, oil, or the infusion of tobacco. The most effectual remedy, if at hand, would be the tincture of camphor.

Inflammation produced by insects in the ear is to be treated precisely as that which arises from any other cause.

Polypus excrescences in the meatus.

The author of the foregoing work has treated of polypus adherent to the tympanum. His remarks are equally applicable to that form of this disease in which the excrescence grows from the walls of the meatus. Indeed, in most cases, when the excrescence is so large as to fill the diameter of the cavity, it is impossible to determine where it may be implanted. Did we know it to be attached to the sides of the tympanum we might, without fear, seize it with forceps and tear it away. In all other respects the treatment is the same in both cases.

I am inclined to believe that true polypus rarely occurs in the meatus, and that the excrescence, which is often regarded as such, is merely a crop of morbid granulations shooting from an ulcerated surface.

If a polypus be attached to the membrana there is certainly great danger in tearing it away, lest that organ be lacerated. As we cannot generally determine where its attachment may be, other means are more safe. The frequently-repeated application of the nitrate of silver, will be found to destroy the tumour effectually whatever may be its nature, and at the same time to subvert the diseased action that may have given rise to it. The remedy may be applied in the solid form through a canula introduced to protect the meatus; or a solution may be applied with a camels-hair pencil. Astringent injections should be subsequently employed, to prevent the recurrence of the disease.

Morbid dryness of the meatus.

Morbid dryness of the meatus is almost always the result of constitutional disease. The same morbid state of the capillary system which produces an arid skin, and scanty secretions of all the emunctories, may also produce a diminished secretion of mucus and wax in the ear. This dryness also exists in the tympanum, and there seriously impedes the function of hearing. There is also, almost always, co-existent with this dryness of the ear, a degree of insensibility in the acoustic nerve. This arises from the same constitutional disorder and is immediately dependent probably upon the feeble state of the circulation in the minute vessels and defective nutrition consequent upon it.

It is very plain that in this affection the general health

should first occupy our attention. Means should be employed for the purpose of restoring the secretions, and equalizing the excitement of the system. This will often be accomplished by the employment of purgative medicines, associated with mercurial alteratives; well-regulated regimen; the warm bath; frictions upon the skin; exercise, &c. &c.

In aid of these general means, we may inject the ear with warm milk and water with which a few drops of the oil of rosemary or some other aromatic oil have been blended. The oil of almonds may be occasionally dropped into the ear. The orifice of the meatus should be closed with cotton, in order to preserve the moisture of the organ.

Soap and water, so commonly used when the secretions are redundant would here be injurious.

Inflammation and abscess of the meatus

Is characterized by the general symptoms of inflammation, extreme pain and diminution of the sense of hearing in consequence of the partial or complete closure of the meatus and the morbid excitement which is imparted to the internal ear.

General and local bleeding, especially the latter, should be promptly and repeatedly employed, together with cold applications, purgatives, and indeed the whole apparatus of antiphlogistic means. Should it not be possible to dispel the inflammation, suppuration should be promoted by the application of poultices or fomentations. As soon as there is evidence, from the abatement of pain, sense of weight, and perhaps from fluctuation, that pus is formed, the abscess should be immediately punctured if it be judged accessible to the lancet. Poultices should then be continued and the ear be occasionally syringed with warm water. Should an ulcer remain,

after the subsidence of swelling and inflammation, it is to be treated as will be hereafter stated.

Ulcers of the meatus.

There is no portion of the membranous tissues of the body which seem to be so often the seat of local disease, as those parts of the tegumentary system which line the orifices of canals leading to internal cavities. Here the skin and mucous membrane are insensibly blended with each other, the sensible properties and vital qualities of the one being in some degree lost, and those of the other assumed. Thus, the muco-cuticular membrane which invests the lips, that which enters into the auditory meatus, that which lines the prepuce, and that which is reflected over the verge of the anus, are characterized by the combined qualities of the skin and mucous membranes; they perform the offices of both these tissues, and participate in the diseases of both.

The external and the internal integument, being thus intimately blended with each other, interchange their morbid influences by a continuous sympathy. A morbid state of the mucous lining of the stomach diffuses itself along the membrane till it reaches the skin. The converse of this is true in regard to disease primarily seated in the skin. It is obvious then that the muco-cutaneous tissues are exposed to morbid influences alternately from within and from without. They are also often irritated by the acrid matters which occasionally issue from the internal cavities or which enter them.

Another circumstance which pre-disposes these tissues to frequent disease is their acute sensitiveness, a kind of elective sensibility, which is bestowed upon them for the purpose, in

some places, of guarding against the ingress of substances unfriendly to the powers of life.

The above, as it appears to me, are satisfactory reasons, why the membranes lining the orifices of canals leading to internal cavities are more frequently the seats of disease than either the skin or the pure mucous tissues. They account for the frequent occurrence and obstinate continuance of ulcers of the meatus; of the margins of the eyelids; of the lips, the prepuce, and the verge of the anus.

It is in some one of these regions that the system, when labouring under a pre-disposition to disease, which Saissy has so frequently called a morbific humour, seeks an outlet by which to relieve itself of diseased action. Nature often creates issues there for the purpose of diverting disease from more important organs. These ulcers are very often of a scrofulous character.

Ulcers within the meatus are often caused by the lodgment of some foreign body in the passage—sometimes they are the sequel of abscesses in these canals, arising from any of the causes of inflammation.

The existence of an ulcer within the meatus is easily ascertained by inspection; also by the discharge which issues; this is of a purulent character, but somewhat peculiar. It is more sanious than pus ordinarily is in other parts and has an offensive odour, disagreeable to the patient and those around him.

If the disease arise from one of the transitory causes which I have named, the removal of the cause will interrupt the disease. The recuperative powers of the system are always sufficient to effect the cure of such ulcers, when there exists nothing to defeat their efforts. It is necessary merely to cleanse the meatus by injections of milk and water, or water with a little alkali, or soap, and to protect it from a cold atmosphere.

But very frequently there exists a scrofulous, or some other

morbid diathesis upon which the local disease, once excited, is engrafted and thus maintained. When such is the condition of the system, ulcers in the meatus may occur without any apparent exciting cause, and may be continued for an indefinite period, till the discharge of pus becomes habitual.

It is not probable that such a source of irritation can exist, even in the appendages of the organ of hearing, without, in a greater or less degree, impairing the functions of the organ.—Sometimes morbid granulations shoot from the ulcerated surface and overspread the membrana tympani, excluding the undalations of the air. In other cases the ulceration slowly progresses till the membrana is destroyed, the small bones dislocated, and at last the acoustic nerves participate in the disease.

Since, then, the disease is always a source of great annoyance to the patient, almost always in some degree impairs the perception of sounds, and may altogether destroy it in the ear affected, it is of course very desirable that we should remove the disease, provided it can be accomplished without inflicting upon the system a greater evil.

Treatment.—If the disease be one of recent origin, we may suppress the discharge with little fear of any evil consequences, provided there be not some remote irritation which seeks an outlet for its diseased action in the ear. Difficult dentition in children is often associated with abscess and subsequent ulcers in or behind the ears. Irritation in the stomach and intestines from the retention of acrid secretions, from noxious ingesta and worms, often spends its morbid influence in the same way.

It would certainly be imprudent to attempt the healing of such ulcers till the remote sources of mischief are provided against. The irritation of dentition being passed, the stomach and bowels being evacuated by the use of mercurial cathartics

and restored to a healthy condition by the continued use of laxatives, alteratives and a judicious diet, we may use our local means without fear.

These are various medicated injections. First, we should employ an alkaline solution, for the purpose of deterging the organ, and indeed this should be continued while other means are used. The sulphate, or the acetate of zinc, in the proportion of ten grains to four ounces of water, or other mild metallic astringent, may next be used. Should these prove ineffectual, some solution which may make a stronger impression upon the ulcerated surface, and thus subvert the diseased action, will be necessary. For this purpose the muriate of mercury may be employed, in the proportion of two grains to the ounce; or a solution of the nitrate of silver of the same strength. The sulphate of copper will in some cases be found more effectual than either. In protracted cases these remedies should be used in succession.

Some surgeons hesitate to attempt the suppression of those purulent issues, which may have existed for years in the tympanum. Cases of this description are generally those which will be found to have commenced in infancy, during the period of teething, and which at that time have engrafted themselves upon a scrofulous diathesis and have become habitual.

Certainly it would be very imprudent to attempt the healing of such an ulcer without creating a diversion in some other part, in favour of the sanative powers, and in aid of our remedies. A diseased state is certainly not the most natural condition of the system. A morbid, habitual excretion may have taken the place of a healthy one, and may be necessary, because of the suppression of the latter; but it certainly cannot harmonize equally well with the other functions. If, then, the system has capriciously adopted a morbid habit we should subvert it by re-establishing the healthy one.

We should commence the treatment of such cases by the application of a small blister to the nape of the neck, or to the arm, and this by the application of savin ointment should be kept discharging for some days. In the mean time the general remedies which we have named above should be vigorously employed, till we may suppose that an impression has been made on the system, and then the local means may be put in requisition for the purpose of suppressing the issue. During the employment of the latter, and indeed for some time after the healing of the ulcer, the blister issue should be continued, the surgeon thus leaving open a postern for the enemy to escape, and instead of compelling him to a desperate resistance, allowing him to march off, if he will, with the honours of war.

The reader will have noticed that Saissy, in the foregoing Essay, objects to the application of blisters behind the ear over the mastoid region, and cites cases to show that they are extremely liable to influence injuriously the function of hearing.

DESCRIPTION OF AN INSTRUMENT FOR PERFORATING THE MEMBRANA TYMPANI.

HAVING had occasion in two instances to perforate the membrana tympani, and having found the beneficial effects of the operation soon to cease in consequence of the speedy closure of the artificial opening, I have devised the instrument, represented in the cut, for the purpose of removing a circular portion of the membrane.

It is merely a small cylinder of steel, something less than a line in diameter, and an inch and a half in length from the handle. The extremity is truncated and flat at the end, except that there project from opposite parts of the margin, in the direction of the shaft, two little points, or blades, each of which has a cutting edge, but these edges are on opposite sides. The points are three-fourths of a line in length, and should be made as delicate as possible.

It is obvious that when these cutting points are thrust through a membrane, and the shaft of the instrument is made to revolve, a circular piece must necessarily be cut out. The instrument, as I have ascertained by experiment, will, with the greatest facility, cut a circular piece from any membranous substance—even from paper, which is far more difficult to cut than animal membrane.

In using it I guard it with a piece of a gum-elastic catheter, long enough to extend from the handle to the bases of the points, leaving them projecting. This being first introduced,

so as to touch the membrane at its lower and anterior part, the stylet is conveyed into it, made to perforate the membrane, and then, being twirled in the fingers of the operator, is made to revolve twice or thrice.

The cutting out of a circular piece of the tympanum obviates the necessity of introducing a tent or bougie, as is done by Saissy, and which must create much irritation.

TABLE OF CONTENTS.

Page.

Translator's Preface, - - - - - - - - - - 5

Author's Preface, - - - - - - - - - - - 7

Biographic notice of Jean Antoine Saissy by M. Montain, - 9

Introduction, - - - - - - - - - - - - 17

SECTION FIRST.

On diseases of the membrana tympani, - - - - - - 27

Chap. I. On the fungous membrane which covers the membrana tympani, - - - - - - - - - - - - 28

Chap. II. On polypous excrescences growing from the external face of the membrana tympani, - - - - - - 32

Chap. III. On relaxation of the membrana tympani, - - - 34

Chap. IV. On the sinking or protrusion of the membrana tympani in the form of a pouch, toward the cavity of the tympanum or the external meatus, - - - - - - - - - 38

Chap. V. On morbid tension of the membrana tympani, - - - 41

Chap. VI. On inflammation of the membrana tympani, - - 42

Chap. VII. On induration of the membrana tympani, - - - 64

Chap. VIII. On rupture of the membrana tympani, - - - 68

SECTION SECOND.

On the diseases which affect the cavity of the tympanum, the mastoid cells, the small bones of the ear, and their muscles, - - - - - - - - - - 70

Chap. I. On catarrh of the internal ear, - - - - - - *ib.*

Chap. II. On acute inflammation of the membrane which lines the cavity of the tympanum and the mastoid cells, and on abscesses and purulent accumulations in those cavities, - 82

Chap. III. On dropsy of the cavity of the tympanum and mastoid cells, - - - - - - - - - - - - 109

CHAP. IV. On extravasation of blood into the cavity of the tympanum and mastoid cells, - - - - - - - - 112
CHAP. V. On the accumulation of mucous and ceruminose matters in the cavity of the tympanum and the mastoid cells, - - 114
CHAP. VI. On the obstruction of the cavity of the tympanum and mastoid cells by chalky substances, - - - - - 121
CHAP. VII. On diseases which affect the small bones of the ear, 125
CHAP. VIII. On diseases which may effect the muscles attached to the small bones of the ear, - - - - - - - 127
CHAP. IX. On buzzing (*bourdonnement*) of the ears, - - - 129

SECTION THIRD.

ON THE DISEASES OF THE EUSTACHIAN TUBE, - - - - - 135
CHAP. I. On the imperforate condition of the internal orifice of the eustachian tube and on the obliteration of that canal, - *ib.*
CHAP. II. On catarrh of the eustachian tube, - - - - 142
CHAP. III. On obstruction of the eustachian tube, - - - *ib.*

SECTION FOURTH.

ON DISEASES WHICH, BY AFFECTING PARTS IN THE VACINITY OF THE EUSTACHIAN TUBE, GIVE RISE TO DEAFNESS AND SOMETIMES TO SEVERE DISEASES OF THE INTERNAL EAR, - - - - - 163
CHAP. I. On the inflammatory swelling and abscess of the tonsils and palate half-arches, - - - - - - - *ib.*
CHAP. II. On the catarrhal swelling of the tonsils and the palate half-arches, and on the mucous accumulations which cover or surround the orifice of the eustachian tube, - - - 170
CHAP. III. On polypus of the posterior nares, and other bodies which compress the eustachian tube, regarded as causes of deafness, - - - - - - - - - - - 171

SECTION FIFTH.

ON THE DISEASES OF THE LABYRINTH, - - - - - - 173
CHAP. I. On the diseases of the membranes covering the foramina rotundum and ovale, - - - - - - - - - *ib.*
CHAP. II. On mal-formation of the foramina rotundum and ovale, 174
CHAP. III. On mal-formation of the labyrinth, - - - - 175
CHAP. IV. On inflammation of the nervous expansion of the labyrinth, - - - - - - - - - - - - 177
CHAP. V. On the degeneration of the liquor of Cotunnus, - - 181
CHAP. VI. On the wasting of the liquor of Cotunnus, - - 182

SECTION SIXTH.

On diseases of the acoustic nerve, - - - - - - 184
Conclusion, - - - - - - - - - - - 203

SUPPLEMENT.

ON DISEASES OF THE EXTERNAL EAR.

Wounds of the external ear, - - - - - - - - 206
Ulceration and sloughing of the external ear from pressure, - 207
Mal-position of the external ear, - - - - - - - - 208
Imperforate condition of the external meatus, - - - - 209
Foreign bodies in the meatus externus, - - - - - - 211
Indurated wax in the meatus, - - - - - - - - 213
Insects in the meatus, - - - - - - - - - - 214
Polypus excrescences in the meatus, - - - - - - 215
Morbid dryness of the meatus, - - - - - - - 216
Inflammation and abscess of the meatus, - - - - - 217
Ulcer of the meatus, - - - - - - - - - 218
Description of an instrument for perforating the membrana tympani, 223

THE END.

FROM
H. D. CHAPIN'S
Cheap Book House,
91 MADISON ST.,
Chicago, - Ills.
Libraries Purchased.